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SAZONALIDADE DE *AEDES AEGYPTI* (Linnaeus, 1762) NO MUNICÍPIO DE ELDORADO DO SUL, RS, BRASIL, E SUA RELAÇÃO COM DIFERENTES SITUAÇÕES SANITÁRIAS

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RESUMO

O mosquito *Aedes aegypti* é um dos principais vetores de arbovírus em muitos países, e sua disseminação segue gerações que buscam combater sua proliferação e a transmissão de Dengue. O Programa Nacional de Controle da Dengue (PNCD) foi estabelecido em julho de 2002 pelo Ministério da Saúde e surgiu como um conjunto de ações destinadas a lidar melhor com a dengue e reduzir o impacto da doença no Brasil. Atualmente, cada município no Brasil possui seu próprio Programa de Controle da Dengue e medidas internas de controle. A cidade de Eldorado do Sul, localizada no estado do Rio Grande do Sul, juntamente com a Secretaria de Saúde, possui um programa de prevenção e controle da dengue que utiliza o Levantamento Rápido de Índices de *Aedes aegypti* (LIRAa). Os esforços de coleta para o controle do vetor são realizados por meio de Pontos Estratégicos (PE's), que são locais com alta concentração de locais de reprodução preferenciais, ou seja, lugares vulneráveis à introdução do vetor. Esses PE's são identificados e atualizados regularmente, inspecionados quinzenalmente em ciclos, sendo que larvas e pupas são coletadas sempre que presentes. O objetivo deste artigo foi avaliar e compreender a distribuição e sazonalidade dos locais de reprodução do *Ae. aegypti* durante as visitas aos Pontos Estratégicos no distrito central de Eldorado do Sul, realizadas pelo Programa Municipal de Controle da Dengue, de 2018 a 2022. Através da análise das coletas, foi verificado que as populações de *Ae. aegypti*, *Ae. albopictus* e outras espécies de mosquitos apresentaram flutuações em seus números ao longo de diferentes estações e anos. Isso provavelmente foi influenciado por fatores como temperatura, umidade, precipitação e outras condições ambientais que afetaram a reprodução, desenvolvimento e atividade dos mosquitos.

Palavras-chave: dengue; vetor; pontos estratégicos; *Aedes aegypti*; transmissão; Eldorado do Sul; ecologia.

ABSTRACT

The *Aedes aegypti* mosquito is one of the main vectors of arboviruses in many countries, and its spread continues to challenge generations striving to combat its proliferation and the transmission of Dengue. The National Dengue Control Program (PNCD) was established in July 2002 by the Ministry of Health and emerged as a set of actions aimed at dealing better with dengue and reducing the impact of the disease in Brazil. Currently, each municipality in Brazil has its own Dengue Control Program and internal control measures. The city of Eldorado do Sul, located in Rio Grande do Sul State, together with the Department of Health, has a dengue prevention and control program that uses the Rapid Survey of *Aedes aegypti* Indices (LIRAa). Active search efforts for vector identification were carried out through Strategic Points (PEs), defined as the locations with a high concentration of preferred breeding sites, i.e., places vulnerable to the introduction of the vector. These PEs were identified and updated every two weeks, with mosquito larvae and pupae collected whenever present. The objective of this article was to access and understand the distribution and seasonality of *Aedes aegypti* breeding sites during visits to PEs in the Central District of Eldorado do Sul, conducted by the Dengue's Municipality Control Program from 2018 to 2022. Through the analysis of insect active search, it was found that populations of *Ae. aegypti*, *Ae. albopictus*, and other mosquito species showed fluctuations in their numbers throughout different seasons and years. This was likely influenced by factors such as temperature, humidity, precipitation, and other environmental conditions that affected mosquito reproduction, development, and activity.

Keywords: dengue; vector; Strategic Points; *Aedes aegypti*; transmission, Eldorado do Sul, ecologia.

SUMÁRIO

1 INTRODUÇÃO

A falta de saneamento básico, as más condições de moradia e educação, urbanização desorganizada, acúmulo de resíduos urbanos, armazenamento incorreto de água e a falta de informação da população, permitem a proliferação do mosquito *Aedes aegypti* e o aparecimento de casos clínicos que estejam relacionados aos focos do vetor.

No Brasil, o mosquito *Aedes aegypti* (Linnaeus, 1762) possui a capacidade de transmitir arboviroses, como dengue, chikungunya, zika e febre amarela urbana. Por circular no ambiente urbano, e pelo homem ser seu principal alvo, a espécie tornou-se um organismo doméstico. Na cidade de Eldorado do Sul-RS, onde o estudo foi desenvolvido, a prefeitura desenvolve o Programa de Prevenção e Controle da Dengue para identificar os locais que não estejam colaborando com o combate ao mosquito causador da doença e minimizar os focos de dengue.

Avaliar a distribuição e sazonalidade dos focos de mosquitos identificados durante as visitas aos Pontos Estratégicos (PEs) do distrito sede de Eldorado do Sul, realizadas pelo Programa Municipal de Controle da Dengue, no período de 2018 a 2022.

1.1 O MOSQUITO *Aedes* sp.

O *Aedes aegypti* (Linnaeus,1762) e também o *Aedes albopictus* (Skuse, 1894) pertencem ao RAMO Arthropoda (pés articulados), CLASSE Hexapoda (três pares de patas), ORDEM Diptera (um par de asas anterior funcional e um par posterior transformado em halteres), FAMÍLIA Culicidae, GÊNERO *Aedes*.

As duas espécies citadas podem transmitir dengue e outras arboviroses como chikungunya, Zika e febre amarela. A primeira descrição do mosquito *Ae. aegypti* ocorreu no Egito durante o século XVIII, por Linnaeus (Zara *et al*., 2016). Algumas adaptações da espécie permitiram que elas se tornassem mais resistentes a ambientes urbanos, e fossem levados de uma área para outra. A fêmea do mosquito *Ae. aegypti* consegue fazer ingestões múltiplas de sangue durante um único ciclo gonadotrófico, o que amplia a sua capacidade de se infectar e de transmitir os vírus, a tornando um vetor eficiente (Scott *et al*., 1993).

O *Ae. albopictus* possui sua origem na Ásia, tem a capacidade de tolerar baixas temperaturas e prefere ambientes rurais e silvestres, possui alimentação baseada em sangue humano e de animais silvestres e sua reprodução ocorre em depósitos naturais (Moore *et al*., 1988).

O comportamento do *Ae. aegypti* e do *Ae. albopictus* se diferenciam no processo de transmissão, propagação do vírus e propagação das espécies (Zara et at., 2016). A condição climática é o principal fator que interfere no ciclo vital do mosquito *Ae. aegypti* (Zara *et al*., 2016).

1.2 O GÊNERO *AEDES* NO BRASIL

Os mosquitos do gênero *Aedes* são considerados os vetores mais importantes dos vírus transmitidos por artrópodes. Na América Latina, o *Aedes aegypti* é o principal mosquito vetor dos vírus da dengue, chikungunya e zika. Além disso, o *Aedes albopictus* também demonstrou ser um vetor competente dos vírus relatados acima. *Ae. albopictus* é de importância médica devido ao seu comportamento agressivo de picar humanos durante o dia, capacidade de se adaptar a climas mais frios e viver em recipientes artificiais e naturais próximos aos humanos, resultando na transmissão de doenças em novas áreas geográficas (Jansen *et al*., 2022). O *Ae. albopictus* também está presente na América Latina, os países dessa região devem considerar as possíveis implicações dessa espécie de mosquito na transmissão de vírus para os seres humanos (Jansen *et al*., 2022).

Acredita-se que o mosquito *Ae. aegypti* tenha chegado no Brasil, no período colonial, durante o comércio dos escravos, já que a espécie já apresentava resistência à mudança de habitat (Zara *et al*., 2016). Em 1955, uma grande campanha realizada pela Organização Pan-Americana de Saúde causou a erradicação do *Ae. aegypti* no Brasil e em diversos outros países americanos, porém, a campanha não chegou até o final e o mosquito permaneceu presente em várias ilhas do Caribe, Guianas, Suriname, Venezuela e sul dos Estados Unidos, voltando a espalhar-se (Instituto Fiocruz Minas, 2023). Em 1963, foi comprovada a circulação dos sorotipos DENV-2 e DENV-3 em vários países, e no fim da década de 60, o Brasil novamente contava com a presença do vetor em suas principais metrópoles (Instituto Fiocruz Minas, 2023). Em 1967,o mosquito foi reintroduzido na cidade de Belém e, em 1974, o mosquito já infestava Salvador, chegando ao Rio de Janeiro novamente no final da década de 70 (Instituto Fiocruz Minas, 2023). Em 1986, ocorreu o primeiro registro de *Ae. albopictus* no Brasil, no estado do Rio de Janeiro, depois em Minas Gerais e em São Paulo e, no ano seguinte, no Espírito Santo. Em 2014, foi relatada presença do *Ae. albopictus* em 3.285 municípios brasileiros, e sua ausência em quatro estados: Sergipe, Acre, Amapá e Roraima (Zara *et al*., 2016).

O primeiro foco do mosquito *Ae. aegypti* no Rio Grande do Sul (RS) foi identificado em 1995, no município de Caxias do Sul; no ano seguinte, a doença passou a ser de notificação compulsória (Erika *et al*., 2018). Também neste período, o Ministério da Saúde começa a implantar ações relativas ao Plano de Erradicação do *Ae. aegypti* (PEAa), que, posteriormente, muda para uma perspectiva de controle e transforma-se no Programa Nacional de Controle da Dengue (PNCD) e se estende a todo o território nacional (Erika *et al*., 2018). A partir de 1995, o número de municípios nos quais o mosquito foi encontrado cresceu tanto que em 2017, praticamente a metade dos 497 municípios do Rio Grande do Sul registraram a presença do mosquito, influenciando na distribuição da doença (Erika *et al*., 2018).

1.3 A DENGUE

Segundo a Organização Mundial de Saúde (2008), a dengue se tornou um problema de saúde pública não somente no Brasil, mas também em diversos países do mundo, pois cerca de 2,5 bilhões de pessoas vivem nas áreas onde o vírus da doença pode ser transmitido. O vírus da dengue inclui quatro sorotipos diferentes (DEN-1, DEN-2, DEN-3 e DEN-4) (Mendonça *et al*., 2009).

O quadro epidemiológico tem se caracterizado com epidemias recorrentes, mais visíveis nos grandes centros urbanos. O aumento de ocorrência da dengue tem se constituído em um crescente objeto de preocupação para a sociedade e, em especial, para as autoridades de saúde, em razão das dificuldades enfrentadas para o controle das epidemias produzidas por esse vírus e pela necessidade de ampliação da capacidade instalada dos serviços de saúde para atendimento aos indivíduos acometidos com formas graves, em especial a febre hemorrágica de dengue (Barreto, Teixeira, 2008).

A incidência da dengue tem crescido drasticamente em todo o mundo nas últimas décadas. O número real de casos da doença é subnotificado e muitos são classificados de forma equivocada. Estimativas recentes indicam 390 milhões de infecções por dengue por ano (95% de intervalo de credibilidade, 284-528 milhões), dos quais 96 milhões (67-136 milhões) se manifestam clinicamente, com qualquer gravidade da doença. Outro estudo sobre a prevalência da dengue estima que 3,9 bilhões de pessoas em 128 países estão em risco de infecção pelo vírus da doença (Organização Pan-Americana de Saúde, 2023).

Estados Membros em três regiões da OMS informam regularmente o número anual de casos. A quantidade de notificações aumentou de 2,2 milhões em 2010 para 3,2 milhões em

2015. Embora a carga global da doença seja incerta, o início de atividades para registrar todos os casos de dengue explica, em parte, o forte aumento no número de casos notificados nos últimos anos. (Organização Pan-Americana de Saúde, 2023).

1.3.1 A transmissão da dengue

De acordo com a Secretaria de Saúde do Rio Grande do Sul, a principal forma de transmissão é pela picada da fêmea infectada do mosquito *Aedes aegypti*. O ciclo da transmissão se inicia com um mosquito não infectado, picando uma pessoa infectada com o vírus da dengue. O mosquito ingere o sangue contaminado, que se replica no interior do mosquito de 8 a 12 dias. Após esse período, o mosquito infectado, pica uma pessoa não infectada, e no período de 3 a 15 dias, a pessoa inicia os sintomas da dengue. O mosquito permanece infectado até o fim de sua vida, que pode chegar a 45 dias (Ministério da Saúde, 2023). Outras formas menos comuns de transmissão são por meio de transfusão de sangue ou da gestante para o bebê. Não há transmissão por contato direto com uma pessoa infectada (Ministério da Saúde, 2023).

Nas últimas décadas, o Ministério da Saúde tem apoiado e acompanhado o desenvolvimento de novas tecnologias para desenvolver vacinas e medicamentos para prevenir e controlar doenças transmitidas pelo *Ae. aegypti* (Ministério da Saúde, 2023). A Anvisa aprovou o início dos estudos da fase III da vacina contra a dengue do Instituto Butantan, e a Fiocruz também realiza pesquisas sobre vacinas contra a dengue, além de outros laboratórios internacionais (Ministério da Saúde, 2023). Para infecções por vírus chikungunya e zika, o controle do *Aedes* é atualmente o único método disponível para prevenir e controlar a transmissão. A Organização Mundial da Saúde recomenda o uso de um programa de Manejo Integrado de Vetores para controlar as populações de mosquitos (Jansen *et al*., 2022).

1.4 O PROGRAMA NACIONAL DE COMBATE A DENGUE (PNCD)

O Programa Nacional de Combate a Dengue (PNCD), foi instituído em julho de 2002, pelo Ministério da Saúde e surgiu como um conjunto de ações que buscam um melhor enfrentamento contra a dengue e a redução do impacto da dengue no Brasil. O objetivo é a vigilância epidemiológica da dengue e a redução do número de casos e epidemias, sendo de fundamental importância que a implementação das atividades de controle ocorra para a detecção precoce da circulação viral e adoção de medidas de bloqueio adequadas para interromper a transmissão. O PNCD busca reduzir a infestação pelo *Ae. aegypti*, reduzir a incidência da dengue e reduzir a letalidade por febre hemorrágica de dengue (Ministério da Saúde, Fundação Nacional de Saúde, 2002).

O Programa Nacional de Controle da Dengue (PNCD) foi implantado por intermédio de 10 componentes. Em cada unidade federada são realizadas adequações condizentes com as especificidades locais. A vigilância epidemiológica da dengue no PNCD é baseada na vigilância de casos, vigilância laboratorial, vigilância em áreas de fronteira e vigilância entomológica (Ministério da Saúde, Fundação Nacional de Saúde, 2002).

1.5 A CIDADE DE ELDORADO DO SUL - RS

O Município de Eldorado do Sul está localizado na Região Carbonífera, situado a 12 km de Porto Alegre. O município possui cerca de 42.490 hab. (estimada IBGE/2021). Ele integra a área de preservação ambiental do Delta do Jacuí e possui uma paisagem exuberante às margens do Rio Jacuí e do Lago Guaíba, apresentando uma vocação natural para o turismo. Eldorado do Sul vem se constituindo em um polo para instalação de empresas de diversos segmentos. Também tem atraído empreendimentos no setor imobiliário, pois alia as facilidades decorrentes de sua proximidade com a Capital a fatores como tranquilidade e qualidade de vida. No setor primário, destacam-se o cultivo do arroz e a pecuária, além da produção de hortifrutigranjeiros (Prefeitura Municipal de Eldorado do Sul, 2023).

1.1 OBJETIVOS

1.1.1 Objetivo geral

Avaliar a distribuição e sazonalidade dos focos de mosquitos identificados durante as visitas aos Pontos Estratégicos (PEs) do distrito sede de Eldorado do Sul, realizadas pelo Programa Municipal de Controle da Dengue, no período de 2018 a 2022.

1.1.2 Objetivos específicos

a) Compilar os dados das identificações laboratoriais dos mosquitos coletados em Pontos Estratégicos (PEs) de Eldorado do Sul no período de interesse.
b) Analisar a distribuição de *Aedes aegypti*, *Aedes albopictus* e outras espécies nos bairros do município de Eldorado do Sul.
c) Relacionar dados climáticos que possam influenciar na proliferação do vetor.
d) Relacionar e comparar a ocorrência de focos com os meses dos anos.
e) Comparar a ocorrência dos focos nos períodos de pré e pós pandemia de COVID-19.

2 ARTIGO CIENTÍFICO

AEDES AEGYPTI (Linnaeus, 1762) SEASONALITY IN THE MUNICIPALITY OF ELDORADO DO SUL, RS, BRAZIL, AND ITS RELATIONSHIP WITH DIFFERENT SANITARY SITUATIONS

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Abstract: The *Aedes aegypti* mosquito is one of the main vectors of arboviruses in many countries, and its spread continues to challenge generations striving to combat its proliferation and the transmission of Dengue. The National Dengue Control Program (PNCD) was established in July 2002 by the Ministry of Health and emerged as a set of actions aimed at dealing better with dengue and reducing the impact of the disease in Brazil. Currently, each municipality in Brazil has its own Dengue Control Program and internal control measures. The city of Eldorado do Sul, located in Rio Grande do Sul State, together with the Department of Health, has a dengue prevention and control program that uses the Rapid Survey of *Aedes aegypti* Indices (LIRAa). Active search efforts for vector identification were carried out through Strategic Points (PEs), defined as the locations with a high concentration of preferred breeding sites, i.e., places vulnerable to the introduction of the vector. These PEs were identified and updated every two weeks, with mosquito larvae and pupae collected whenever present. The objective of this article was to access and understand the distribution and seasonality of *Aedes aegypti* breeding sites during visits to PEs in the Central District of Eldorado do Sul, conducted by the Dengue's Municipality Control Program from 2018 to 2022. Through the analysis of insect active search, it was found that populations of *Ae. aegypti*, *Ae. albopictus*, and other mosquito species showed fluctuations in their numbers throughout different seasons and years. This was likely influenced by factors such as temperature, humidity, precipitation, and other environmental conditions that affected mosquito reproduction, development, and activity.

Keywords: dengue; vector; strategic points; *Aedes aegypti*; transmission.

Aedes aegypti (Linnaeus,1762) is a prominent arbovirus vector in many countries, making ethological study of this mosquito imperative for a deeper understanding of its behavior, virus transmission dynamics, and to optimize entomological surveillance while enhancing vector control efficiency (Lana *et al*., 2018). In Brazil, the transmission of the dengue virus (DENV) to humans occurs through the bite of the *Ae. aegypti* mosquito.

The propagation of the dengue virus transcends generations over historical epochs, and its adaptability poses an enigma for researchers who strive for a more comprehensive comprehension of vector ecology. This pursuit aims to untangle their patterns and conduct, thus curbing their proliferation and the transmission of dengue. To mitigate dengue outbreaks, a multitude of alternatives have been conceived, encompassing chemical control through larvicides, genetic manipulation targeting mosquito fertility reduction, biological control employing natural predators, physical interventions within vector control programs, and vector control encompassing public policies and societal engagement (Donalísio, Glasser, 2002).

An exemplar of vector control is achieved through Entomological Surveillance, a tool employed by health surveillance agencies to amass and dissect information concerning insects, fauna assessments, monitoring endeavors, and epidemiological inquiries pertaining to diseases triggered by vector-borne pathogens. The National Dengue Control Program (PNCD) encompasses a range of initiatives designed to more effectively tackle the issue and mitigate the impact of dengue in Brazil. Its primary objective revolves around epidemiological surveillance, with the aspiration to curtail the number of cases and the incidence of epidemics. The surveillance of dengue hinges on resources such as information systems (National Notifiable Diseases Surveillance System - Sinan, and the Yellow Fever and Dengue System - FAD), as well as proficient experts skilled in the utilization of these tools (Ministério da Saúde, Fundação Nacional da Saúde, 2002).

Utilizing the guidance of the National Dengue Control Program, each municipality in Brazil has designed its unique Dengue Combat and Control Programs, aiming to curtail the prevalence and spread of *Ae. aegypti*. The Health Department of Eldorado do Sul-RS has implemented a comprehensive dengue prevention and control strategy by employing the Rapid Survey of *Ae. aegypti* Indices (LIRAa), which enables the attainment of statistically reliable outcomes. LIRAa swiftly and securely presents metrics indicating larval infestations (House and Breteau indices), thereby serving as an evaluative tool to assess the impact of control measures (Ministério da Saúde, 2013). Referred to as Strategic Points (SPs), these locations harbor significant concentrations of preferred breeding sites, essentially making them areas susceptible to vector proliferation. These SPs are identified, registered, and consistently updated, undergoing biweekly inspection cycles that involve the collection of larvae and pupae whenever they are detected.

Approximately 500 million people in the Americas are at risk of contracting dengue. The number of dengue cases in the region has increased over the past four decades, escalating from 1.5 million accumulated cases in the 1980s to 16.2 million in the 2010-2019 decade (Organização Pan-Americada de Saúde, 2023).

Up until July 25, 2023, the State Center for Health Surveillance (CEVS), associated with the State Department of Health of Rio Grande do Sul, has documented 54 fatalities attributed to dengue (Secretaria Estadual de Saúde do Rio Grande do Sul, 2023). This emphasizes the significance of individuals seeking medical attention at healthcare facilities at the outset of symptoms, thereby mitigating disease aggravation and potential mortality. As of July 25, 2023, the state of Rio Grande do Sul has already registered 27,790 confirmed cases of the ailment, out of which 24,971 (89.86%) were locally acquired (autochthonous), while the remaining cases were imported (residents of RS infected while traveling elsewhere) (Secretaria de Estado de Saúde do Rio Grande do Sul, 2023). In 2022, RS reported its highest incidence rates of the disease, encompassing over 57,000 autochthonous cases and an additional 11,000 imported cases. In total, there were 66 deaths attributed to dengue in the year 2022 (Secretaria de Estado de Saúde do Rio Grande do Sul, 2023).

Given the increasing number of positive dengue cases and fatalities in the state of Rio Grande do Sul in recent years, it has become imperative to investigate the factors underlying this significant upsurge. One potential factor that may be linked to this increase is the climatic aspect. The occurrence of early rains, driven by the El Niño Southern Oscillation (ENSO) phenomenon (Wang *et al*., 2016), could have potentially facilitated the proliferation of the *Ae. aegypti* mosquito (Ferreira *et al*., 2022).

ENSO events modulate the climate of tropical regions, such that in El Niño years, due to reduced and prolonged rainfall, the necessary environmental conditions for the development of the Dengue vector are not favored. On the other hand, in years of higher precipitation, as in La Niña, there are frequent episodes of flooding and inundation, particularly in urban areas. This directly contributes to the proliferation of breeding sites for the mosquito vector and, consequently, dengue transmission (Moraes *et al*., 2019).

During a portion of the sampling period of this study, starting from March 2020, the pandemic caused by the coronavirus named SARS-CoV-2 occurred, leading to the emergence of the Severe Acute Respiratory Syndrome (COVID-19). The World Health Organization (WHO) declared a state of public emergency, recommending that governments implement protective measures for their populations, such as social isolation, while minimizing gatherings. With the advent of the pandemic, it is believed that preventive actions against dengue, aimed at combating potential vector breeding sites, might have been neglected due to the country's health situation amid the COVID-19 pandemic, which restricted the circulation and entry of surveillance agents into residences (Gagossian *et al*., 2022).

MATERIALS AND METHODS

The mosquito collection data were sourced from the records of the Municipal Entomology Laboratory of Eldorado do Sul, which generously supplied the data for this research. The samples were gathered during visits to the Strategic Points situated within the municipality, covering the timeframe from 2018 to 2022.

The tables were divided by year, organized by species, and categorized into *Ae. aegypti*, *Aedes albopictus* (Skuse,1894), and other species. Through these tables, it was feasible to track the outcomes for each Epidemiological Week of the months and determine the type of premises where the species were encountered, whether residential properties, vacant lots, or Strategic Points.

The collection of species occurred at the Strategic Points (SPs) situated within the Sede district of Eldorado do Sul-RS municipality, encompassing neighborhoods such as Centro, Centro Novo, Cidade Verde, Itaí, Medianeira, Progresso, Residencial Novo, Loteamento Popular, Sans Souci, Sol Nascente, Vila da Paz, Industrial, and Picadas (north and south). The sampling period spanned from 2018 to 2022. The Strategic Points were revisited biweekly by the Agents of Endemic Combat (ACE), who conducted home visits to disseminate information about their work and provide guidance on dengue prevention.

All containers holding water during the home visits were examined, as they could potentially serve as breeding sites for mosquitoes. The collection sites were treated with larvicide, and when breeding sites were found, the responsible individuals were alerted and instructed to either eliminate or maintain them, ensuring that the area was inspected and addressed for the subsequent cycle.

The entomological indicators, which were also included in the collections, were calculated based on the Index + Treatment Survey (I+T), and they referred to infestation indices calculated by larval stages. In addition to the indicators, there were other pieces of information regarding the collection areas for each cycle. This allowed for determining the number of properties within the collection area and how many were visited. Data such as the House Index and Breteau Index (HI % BI %) and the Container Index (CI %) were also provided. The Container Index represents the percentage relationship between the number of positive containers of a specific type and the total number of containers surveyed for larvae. This index indicates the need for specific control measures.

Based on the collection dates from the Municipal Entomology Laboratory of Eldorado do Sul's table, a comparison was conducted between the species found in the Strategic Points (PEs) and the meteorological data from those collection dates. Meteorological data were gathered from the National Institute of Meteorology, using results from the conventional weather station in Porto Alegre, which serves as a reference for Eldorado do Sul. Information such as temperature, rainfall, and humidity during the chosen period was analyzed. Based on this data, an average of the results was calculated. This allowed for investigating whether the species found had a correlation with the climatic variations during the collection periods. The aim was to ascertain the distribution and seasonality of mosquito breeding sites.

RESULTS AND DISCUSSION

In the year 2018, *Ae. aegypti* larvae were collected at Strategic Points located in the neighborhoods of Industrial, Itaí, Centro, and Residencial Novo. *Ae. albopictus* larvae were found in the Industrial neighborhood, and larvae of other mosquito species were identified in the Centro, Industrial, Medianeira, Bom Retiro, Progresso, Eldorado do Sul, Residencial Novo, Itaí, Posto Rodoviário, Picada Sul, and Sans Souci neighborhoods. In total, 26 *Ae. aegypti* larvae, 3 *Ae. albopictus* larvae, and 347 larvae of other species were collected (Table 1).

Neighborhood	**Collection Month**	***Ae. aegypti***	***Ae. albopictus***	**Other spp.**
Centro	January			10
Industrial	January			18
Industrial	February			28
Medianeira	March			16
Bom Retiro	March			13
Industrial	March		3	17
Progresso	March			19
Eldorado do Sul	March			8
Residencial Novo	April			10
Itaí	April			21
Posto Rodoviário	April			21
Industrial	April	8		9
Itaí	May	1		19
Picada Sul	May			10
Residencial Novo	May			18
Centro	May	8		11
Industrial	May			20
Centro	June			9
Centro	August	1		21
Sans Soucci	August			9
Residencial Novo	October			8
Eldorado do Sul	November			10
Residencial Novo	November			8
Eldorado do Sul	December			2
Centro	December			11
Residencial Novo	December	8		1

Total		26	3	347

Table 1: Collections at Strategic Points in the year 2018.

In the year 2019, *Ae. aegypti* larvae were collected at Strategic Points located in the neighborhoods of Chácara, Centro, and Medianeira. *Ae. albopictus* larvae were found in the Picada Sul and Picada Norte neighborhoods, and larvae of other mosquito species were identified in the Centro, Industrial, Eldorado do Sul, Delta do Jacuí, Chácara, Picada Sul, Picada Norte, Residencial Novo, Centro Novo, Bom Retiro, and Medianeira neighborhoods. In total, 16 *Ae. aegypti* larvae, 11 *Ae. albopictus* larvae, and 306 larvae of other species were collected (Table 2).

Neighborhood	**Collection Month**	***Ae. aegypti***	***Ae. albopictus***	**Other spp.**
Centro	February			10
Eldorado do Sul	February			8
Industrial	April			11
Delta do Jacui	May			5
Chácara	May	2		
Picada Sul	May		6	22
Picada Norte	May		5	6
Residencial Novo	May			10
Industrial	May			10
Chácara	June			
Centro Novo	June			
Bom Retiro	June			49
Industrial	July			9
Bom Retiro	July			36
Centro	October	2		3
Medianeira	November	9		
Itaí	November			2
Residencial Novo	November			37
Asmorio	November			9
Cidade Verde	November	3		12
Industrial	November			51
Picada Norte	November			16
Total		16	11	306

Table 2: Collection at Strategic Points in the year 2019.

In the year 2020, *Ae. aegypti* larvae were collected at Strategic Points located in the neighborhoods of Centro, Medianeira, Cidade Verde, Residencial Novo, Industrial, Delta do Jacuí, Posto Rodoviário, Progresso, and Picada Sul. *Ae. albopictus* larvae were found in the Industrial, Cidade Verde, Residencial Novo, and Picada Sul neighborhoods, and larvae of other mosquito species were identified in the Centro, Itaí, Medianeira, Cidade Verde, Residencial Novo, Posto Rodoviário, Picada Sul, Bom Retiro, Picada Norte, Chácara, and Guaíba Country Club neighborhoods. In total, 413 *Ae. aegypti* larvae, 55 *Ae. albopictus* larvae, and 857 larvae of other species were collected (Table 3).

Neighborhood	Collection Month	*Ae. aegypti*	*Ae. albopictus*	Other spp.
Chácara	January			11
Itaí	April			12
Centro	April	99		10
Medianeira	April	16		4
Cidade Verde	April	29		6
Residencial Novo	April	6		9
Industrial	April	5	4	2
Delta do Jacuí	April	3		
Posto Rodoviário	April	5		6
Picada Sul	April			6
Bom Retiro	April			14
Cidade Verde	May	33		
Centro	May	38		
Picada Sul	May	5	17	14
Industrial	May	7	6	1
Delta do Jacuí	May	4		
Medianeira	May	25		
Residencial Novo	May		1	2
Bom Retiro	May			24
Parque das Acácias	May		1	
Guaiba Country Club	May		8	
Centro	June	28		5
Cidade Verde	June	25		5
Residencial Novo	June	9		9
Industrial	June	12	2	
Progresso	June	4		
Picada Norte	June			5
Delta do Jacuí	June			9
Bom Retiro	June			31
Chácara	June			19
Picada Sul	June		6	
Guaiba Country Club	June		2	
Medianeira	June	7		
Posto Rodoviário	June	5		
Picada Sul	July	1	5	9
Residencial Novo	July			6

Centro	July	5		
Chácara	July			9
Industrial	July	1	3	
Bom Retiro	July			26
Chácara	August			3
Guaiba Country Club	August			6
Cidade Verde	August			6
Industrial	August	2		
Bom Retiro	September			12
Chácara	September			22
Industrial	September			11
Residencial Novo	September			20
Picada Sul	September			8
Centro	September	5		1
Posto Rodoviário	October			15
Bom Retiro	October			18
Cidade Verde	October			17
Picada Sul	October			16
Residencial Novo	October			27
Centro	October	16		26
Chácara	October			30
Delta do Jacuí	October			19
Industrial	October			23
Posto Rodoviário	November			5
Cidade Verde	November	7		30
Residencial Novo	November			23
Chácara	November			23
Centro	November	7		51
Picada Sul	November			5
Eldorado do Sul	November			6
Industrial	November			8
Delta do Jacuí	November			13
Progresso	December	4		
Picada Sul	December			19
Eldorado do Sul	December			9
Chácara	December			27
Industrial	December			12
Residencial Novo	December			26
Cidade Verde	December			15
Centro	December			39
Delta do Jacuí	December			5
Bom Retiro	December			7

Total		413	55	857

Table 3: Strategic Points Collections in the Year 2020.

In the year 2021, *Ae. aegypti* larvae were collected at Strategic Points located in the neighborhoods of Industrial, Posto Rodoviário, Cidade Verde, Centro, Sans Souci, Residencial Novo, Progresso, Medianeira, and Delta do Jacuí. *Ae. albopictus* larvae were found in the Picada Sul, Industrial, Bom Retiro, and Parque das Acácias neighborhoods, and larvae of other mosquito species were identified in the Centro, Industrial, Medianeira, Bom Retiro, Progresso, Eldorado do Sul, Residencial Novo, Itaí, Posto Rodoviário, Picada Sul, Parque das Acácias, and Sans Souci neighborhoods. In total, 288 *Ae. aegypti* larvae, 20 *Ae. albopictus* larvae, and 984 larvae of other species were collected (Table 4).

Neighborhood	**Collection Month**	***Ae. aegypti***	***Ae. albopictus***	**Other spp.**
Bom Retiro	January			6
Posto Rodoviário	January	1		
Centro	January	14		31
Parque das Acácias	January			5
Residencial Novo	January			23
Cidade Verde	January	11		29
Picada Sul	January			4
Industrial	January	6		17
Chácara	January			10
Bom Retiro	February			12
Centro	February	21		33
Sans Soucci	February	8		
Chácara	February			8
Eldorado do Sul	February			9
Residencial Novo	February	5		21
Industrial	February	4		
Cidade Verde	February	10		5
Delta do Jacuí	February			1
Picada Sul	March		8	
Industrial	March	2	2	9
Delta do Jacuí	March			7
Centro	March			5
Eldorado do Sul	March			6
Residencial Novo	March			5
Bom Retiro	April		3	2
Progresso	April	5		
Cidade Verde	April	21		17

Medianeira	April	6		4
Chácara	April			14
Industrial	April			4
Centro	April	18		33
Sans Soucci	April	4		
Eldorado do Sul	April			1
Delta do Jacuí	April	1		
Residencial Novo	April			4
Medianeira	May	7		
Cidade Verde	May	15		12
Industrial	May	1		11
Parque das Acácias	May		1	2
Residencial Novo	May			12
Delta do Jacuí	May			5
Chácara	May			12
Centro	May	32		13
Bom Retiro	May			20
Posto Rodoviário	May			8
Sans Soucci	May	2		1
Picada Sul	May		6	
Medianeira	June	2		6
Bom Retiro	June			14
Chácara	June			32
Residencial Novo	June	7		8
Industrial	June			1
Cidade Verde	June			6
Centro	June	11		14
Sans Soucci	June			5
Delta do Jacuí	June			6
Bom Retiro	July			10
Medianeira	July			17
Chácara	July			15
Centro	July			4
Delta do Jacuí	July			2
Industrial	July	2		
Cidade Verde	July	2		12
Industrial	July			7
Bom Retiro	August			8
Medianeira	August			7
Chácara	August			9
Parque das Acácias	August			3
Industrial	August			19

Cidade Verde	August	1		11
Sans Soucci	August			10
Centro	August	5		5
Delta do Jacuí	August			9
Bom Retiro	September			9
Medianeira	September			18
Sans Soucci	September			5
Posto Rodoviário	September			1
Picada Sul	September			16
Centro	September	8		11
Delta do Jacuí	September	1		
Cidade Verde	September			8
Industrial	September			11
Parque das Acácias	September			1
Chácara	September			6
Sans Soucci	September			7
Medianeira	October			14
Bom Retiro	October			14
Progresso	October	1		
Sans Soucci	October			14
Chácara	October			13
Centro	October	6		20
Industrial	October			4
Delta do Jacuí	October			6
Bom Retiro	November			3
Medianeira	November	1		6
Industrial	November	5		9
Cidade Verde	November			5
Sans Soucci	November			3
Centro	November	15		25
Eldorado do Sul	November			6
Residencial Novo	November			12
Delta do Jacuí	November			6
Picada Sul	December			10
Eldorado do Sul	December			6
Industrial	December			11
Sans Soucci	December			4
Residencial Novo	December	1		5
Chácara	December			4
Cidade Verde	December	5		3
Delta do Jacuí	December			10
Centro	December	10		8

Bom Retiro	December			8
Medianeira	December	11		1
Total		288	20	984

Table 4: Strategic Points Collections in the Year 2021.

In the year 2022, *Ae. aegypti* larvae were collected at Strategic Points located in the neighborhoods of Progresso, Residencial Novo, Medianeira, Centro, Cidade Verde, Sans Souci, Picada Norte, Delta do Jacuí, Industrial, and Posto Rodoviário, and Picada Sul. *Ae. albopictus* larvae were found in the Parque das Acácias, Industrial, Picada Sul, and Centro neighborhoods. In total, 466 *Ae. aegypti* larvae and 34 *Ae. albopictus* larvae were collected. There were no larvae of other species collected in the year 2022. The number of larvae of other species was not counted in 2022, as the focus of the collection during this period was prioritized on analyzing only *Ae. aegypti* larvae due to the increase in their occurrences (Table 5).

Neighborhood	**Collection Month**	***Ae. aegypti***	***Ae. albopictus***	**Other spp.**
Parque das Acácias	January		2	
Progresso	January	4		
Residencial Novo	January	3		
Medianeira	January	21		
Centro	January	14		
Cidade Verde	January	11		
Sans Soucci	January	1		
Centro	February	18		
Sans Soucci	February	11		
Medianeira	February	1		
Picada Norte	February	8		
Centro	March	65		
Delta do Jacuí	March	15		
Parque das Acácias	March		12	
Medianeira	March	27		
Sans Soucci	March	21		
Industrial	March	20	1	
Cidade Verde	March	14		
Residencial Novo	March	15		
Progresso	March	2		
Residencial Novo	April	2		
Picada Sul	April	1	2	
Medianeira	April	9		
Centro	April	40	3	
Delta do Jacuí	April	4		

Cidade Verde	April	4		
Industrial	April	5		
Posto Rodoviário	April	4		
Delta do Jacuí	May	22		
Centro	May	50	3	
Cidade Verde	May	13		
Eldorado do Sul	May		3	
Parque das Acácias	May		6	
Posto Rodoviário	May	1		
Medianeira	May	11		
Residencial Novo	May	10		
Picada Sul	June	3		
Residencial Novo	June	2		
Delta do Jacuí	June	1		
Centro	June	5		
Medianeira	July	1		
Parque das Acácias	July		1	
Residencial Novo	August	3		
Picada Sul	October	1	1	
Centro	December	2		
Sans Soucci	December	1		
Total		466	34	0

Table 5: Strategic Points Collections in the Year 2022.

ANALYSIS OF *AEDES AEGYPTI* OCCURRENCES

Examining the years encompassing the study period from 2018 to 2022 reveals a distinct upward trend in the quantity of *Aedes aegypti* larvae detected at strategically designated collection points (PEs), with this trend becoming evident starting in the year 2020. The emergence of the COVID-19 pandemic serves as a plausible explanation for this observed escalation. During the period from 2018 to 2019, subsequent to the pandemic, consistent and methodical measures were implemented to control dengue, resulting in a decrease in instances of larval presence within this timeframe. However, commencing in 2020, a marked increase in these figures became apparent, attributable to a range of potential factors.

Prominent among these factors is the attenuation of dengue control initiatives, adversely affected by the enforced confinement of the population. This circumstance led to the accumulation of stagnant water in containers within shuttered commercial establishments, thereby fostering extended periods conducive to mosquito breeding. Furthermore, a reduction in the complement of Agents of Endemic Combat (ACEs) transpired, originating from their reassignment from dengue control responsibilities to active engagement in COVID-19 containment endeavors. This strategic redirection of ACEs was instigated by the prioritization of sectors aligned with public health, aimed at pandemic surveillance following the global onset of the coronavirus. The diminished presence of ACEs likely yielded decreased treatment interventions and a narrower scope of serviced neighborhoods. Consequently, this scenario feasibly contributed to the upsurge in mosquito populations, as discerned through vigilant monitoring of PEs.

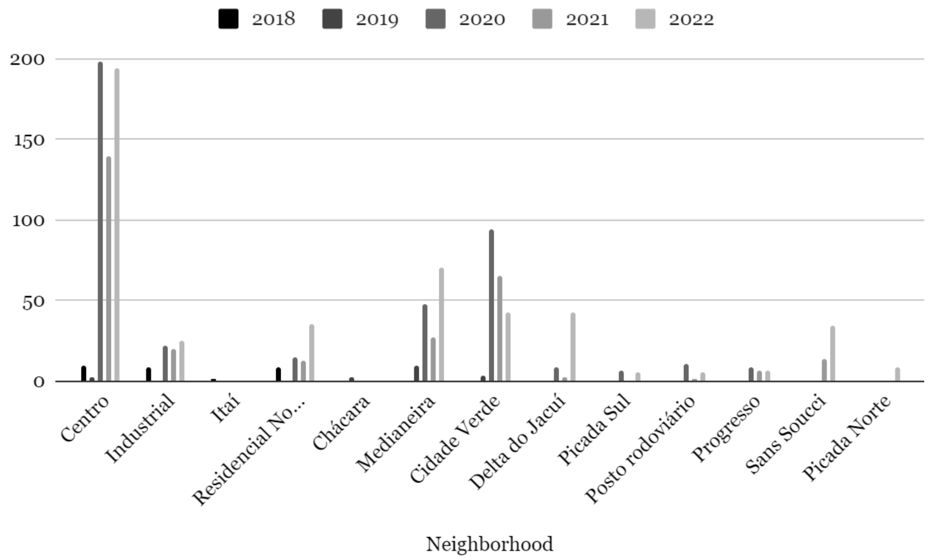

Chart 1: Comparison of *Aedes aegypti* Breeding Sites by Neighborhood Each Year.

Through a comparison of neighborhoods with PE collections during the sampling period, it becomes apparent that there exists variability in the number of samples found within each neighborhood (chart 1). This variability can be attributed to the fact that not all neighborhoods exhibited significant values in terms of *Ae. aegypti* infestations. Notably, the Centro neighborhood stands out due to a pronounced concentration of collected larvae, implying an environment conducive to the proliferation of dengue vectors.

An elucidation for the observed variation among specific neighborhoods can be traced to the reduction in PE monitoring during the period of the coronavirus outbreak. This reduction can be linked to a decrease in the availability of Agents of Endemic Combat (ACEs), who were reassigned to other sectors associated with the pandemic response. This reassignment consequently left certain PE locations devoid of regular collections and upkeep. Consequently, this circumstance undermined the efficacy of surveillance endeavors in these regions, thereby contributing to the observed variation in larval infestations among neighborhoods.

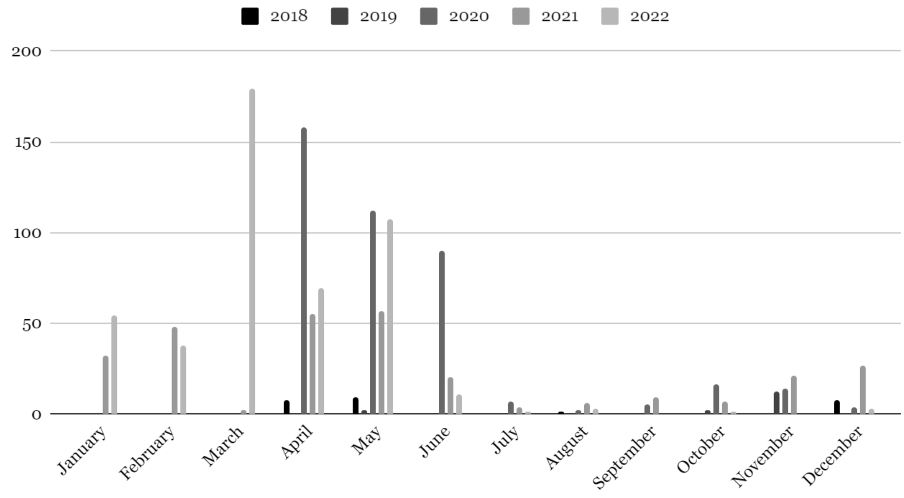

Chart 2: Comparison of *Aedes aegypti* Breeding Sites by Month Each Year.

By aligning the months of PE collections with the years of sampling, it becomes evident that the *Ae. aegypti* infestations increased from the year 2020, with the months of March, April, May, and June showing the highest concentrations of infestations. Beyond the pandemic, various explanations for this increase can be considered, including climatic factors. Between September 2020 and March 2023, the Rio Grande do Sul experienced the La Niña phenomenon, which brought more frequent rains to the state, thereby fostering the proliferation of the *Ae. aegypti* mosquito (chart 2).

During periods of drought, if proper control measures are not taken, *Ae. aegypti* eggs can hatch, giving rise to new mosquitoes. Thus, the continuous implementation of dengue control measures is of utmost importance. By comparing the PE collection dates with climatic data available from the National Institute of Meteorology (INMET), it can be confirmed that during the period of increased *Aedes aegypti* infestations, when the Rio Grande do Sul was under the influence of La Niña, a climatic seasonality occurred that may have contributed to the rise in vector larvae. This is due to significant variations in average temperature, humidity, and precipitation.

Therefore, a relationship between PE collection data, the La Niña phenomenon, and climatic conditions becomes apparent, suggesting that both climatic interactions and seasonal factors could have contributed to the increase in the presence of *Ae. aegypti* larvae during this period.

Through the analysis of data from the Entomology Laboratory of Eldorado do Sul, during the sampling period from 2018 to 2022, and based on the obtained results, it was possible to examine the distribution of *Ae. aegypti*, *Ae. albopictus*, and other species in the neighborhoods of the municipality of Eldorado do Sul. This leads to the conclusion that during the study period, indeed, there was seasonality in the collection results across different neighborhoods and years, which facilitated the proliferation of the mosquito over the years.

The populations of *Ae. aegypti*, *Ae. albopictus*, and potentially other mosquito species exhibited fluctuations in their numbers throughout different seasons and years. This is likely influenced by factors such as temperature, humidity, precipitation, and other environmental conditions that affect mosquito reproduction, development, and activity.

The study's findings suggest that the proliferation of these mosquito species was facilitated by the observed seasonality, meaning that certain times of the year were more conducive to their reproduction and population growth.

The seasonality and proliferation of these mosquito species underscore the importance of targeted mosquito control efforts and public health interventions in Eldorado do Sul, RS. By understanding the patterns of mosquito population dynamics and identifying periods of heightened activity, local authorities and health organizations can implement strategies to mitigate the spread of mosquito-borne diseases. These strategies may include mosquito surveillance, larval control, reduction of breeding sites, and community awareness campaigns.

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3 CONCLUSÃO E PERSPECTIVAS

Através da análise de dados provenientes do Laboratório de Entomologia de Eldorado do Sul, no período de amostragem de 2018 a 2022, e com base nos resultados obtidos, foi possível examinar a distribuição de *Aedes aegypti*, *Aedes albopictus* e outras espécies nos bairros do município de Eldorado do Sul.

Ao analisar as coletas, ficou evidente que as populações de *Ae. aegypti*, *Ae. albopictus* e potencialmente outras espécies de mosquitos apresentaram flutuações em seus números ao longo de diferentes estações e anos. Isso provavelmente foi influenciado por fatores como temperatura, umidade, precipitação e outras condições ambientais que afetaram a reprodução, desenvolvimento e atividade dos mosquitos.

O clima no Rio Grande do Sul durante os anos abrangidos pelo estudo foi influenciado pelo fenômeno La Niña, causando uma mudança climática com quedas de temperatura e um período prolongado de estiagem. Isso permitiu a formação de locais de reprodução para as larvas de *Aedes aegypti*, já que muitos ambientes se tornaram reservatórios de água parada. Além do clima, a ocorrência da COVID-19 também influenciou positivamente o aumento da proliferação do vetor. A partir do ano de 2020, o sistema de saúde priorizou todas as questões relacionadas ao combate ao coronavírus (SARS-CoV-2), deixando em segundo plano o controle e gerenciamento da dengue.

Devido a essa negligência, a doença ressurgiu e atualmente, em 2023, esforços estão sendo feitos para educar a população sobre precauções diárias para prevenir a criação de locais de reprodução para novas larvas de *Aedes aegypti*. A população também é incentivada a procurar assistência médica se apresentarem sintomas da doença.

A sazonalidade e proliferação dessas espécies de mosquitos destaca a importância de esforços direcionados de controle de mosquitos e intervenções de saúde pública em Eldorado do Sul, RS. Ao compreender os padrões de dinâmica populacional dos mosquitos e identificar os períodos de maior atividade, as autoridades locais e as organizações de saúde podem implementar estratégias para mitigar a disseminação de doenças transmitidas por mosquitos. Essas estratégias podem incluir vigilância de mosquitos, controle de larvas, redução de focos de reprodução (eliminação de criadouros) e campanhas de conscientização na comunidade.

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ANEXO A – NORMAS DE PUBLICAÇÃO DA REVISTA ENTOMOBRASILIS

EntomoBrasilis
e-ISSN 1983-0572

EntomoBrasilis
Publication Guidelines
Version 5.1 - June 2021
DOI prefix: 10.2471

We present ***version 5.1*** of the publication guidelines for submitting manuscripts to the online journal EntomoBrasilis. This is an update version, aiming to improve and facilitate the process of composing manuscripts by the authors and also aims at greater agility in the editing process and even possible corrections.

1. GENERAL DESCRIPTION

The journal **EntomoBrasilis** publish scientific articles in English, which will contribute to the scientific knowledge of Brazilian and worldwide entomology.

Articles submitted will be accepted, with results and experiments carried out in any country.

2. PREPARING THE MANUSCRIPT FOR SUBMISSION

The following rules must be observed before submitting the manuscript:

1. Manuscripts should only be sent via the journal's portal (https://www.entomobrasilis.org/).
2. The text should preferably be edited in Microsoft Word™ or LibreOffice Writer™, ***with .doc extension, but the .docx extension is accepted too***;
3. A4 format page, using Open Sans ou Arial size 11, 1.5 space between lines, justified paragraph on the left and right;
4. The numbered pages in the header;
5. ***Numbered lines and restarting each page.***
6. Open Sans or Arial font also for the legends of figures and graphics, with 8 pt;
7. Only tables and graphs/chart can be incorporated into the file containing the text of the manuscript. On separate pages, as long as the file does not exceed ***10 MB***.
8. The font used in the tables may be smaller than 9, but in a size that is sufficient for the reader's understanding.
9. Figures resolution: ***300 dpi*** for color photos/pictures and ***600 dpi*** for line drawings and grayscale photos/pictures. Not exceed ***10 MB***.
10. Figure format: **tiff** format (***LZW*** compression) or ***.jpeg*** or ***.jpg*** without compression, and a 32-bit ***png*** file can be accepted.
11. Charts must be created in LibreOffice.org Calc™ or Microsoft Excel™. Charts created in SigmaPlot™ v12, Statistica™ v7 and R are accepted.
12. Chart/figure or Drawings font: Arial or Open Sans only;
13. Formulas and equations should be developed using the LibreOffice.org Math™ or Microsoft Equation™ or Microsoft Word™.

On the first page start with the **title** of the paper in English on the line below starts the Abstract, with a maximum of ***250 words*** and in a single paragraph; **Keywords**, in English, in alphabetical order, with exactly five terms separated by semicolons.

If the name of a species is informed in the title, it must have the name of the author (s) who described it, without mentioning the year of publication, except in the Taxonomy and Systematics section.

On page 2, the Introduction should start, ***without the need to indicate the word***. Then the item **Material and Methods** should come, which should be well explained, without exaggeration (e.g., pencil, spreadsheet and clipboard were used to write down the data...), but enough so that it can be repeated by other researchers. The **Results and Discussion** item may come together or separately and it must contain the conclusions, as this item will not be explained in the article.

In the body of the text, the names of the gender group and the species group must be written in italics. Scientific names must be followed by the author (do not use ***Small Caps***), at least the first time (there is no need to quote the year of the description, except in the systematic and taxonomy section, which is optional) (*e.g.*, *Camponotus crassus* Mayr). In the second citation of the species onwards, the genus must be abbreviated and the authors' name must not be mentioned (*e.g.*, *C. crassus*).

Note that the Abstract, despite being an integral part of the article / scientific communication, the rule of citing the species is valid as if it were a separate text, so there is a need to only specify the name of the species in full once, regardless if it in the title. Do not use marking, emphasis, or any other signs.

References must be cited in Small Caps[1], with the first capital letter and must be cited as follows:

1. Only one author: Zanol (2006); (Rodrigues 2014);
2. Two authors: Cassino & Rodrigues 2005 or Cassino & Rodrigues (2005);
3. More than two authors: Silva Neto *et al.* (2021); (Silva Neto *et al.* 2021).
4. Between parenthesis: (Cassino & Rodrigues 2005; Rodrigues 2005; Rodrigues 2006; Zanol 2006; Rodrigues & Cassino 2011; Zacca *et al.* 2020; Silva Neto *et al.* 2021), note that it is in chronological order ***and increasing alphabetical order***;
5. When the author publishes more than one work in the same year: Silva Neto *et al.* (2021a, 2021b) ou (Silva Neto *et al.* 2021a, 2021b);
6. When publishing works in several years: Rodrigues (2005, 2010) ou (Cassino *et al.* 2002, 2005; Rodrigues 2005, 2010).

Check that the term *et al.* is in italics, being used to cite more than two authors.

2.1. Figures/Images/Charts/Tables

Figures (photographs, drawings, graphs and maps) must always be numbered with Arabic numerals (Figure 1) and, in the order that appears in the text. Scales, when necessary, must be placed in a vertical or horizontal position. Tables should be

1. In Microsoft Word™ select the quote and press Ctrl + Shift + K at the same time.

numbered with Arabic numerals (Table 1) and included at the end of the text on separate pages. If necessary, graphics can be included in the text file and, like tables, they must come at the end of the text, but it is necessary to indicate the preferred position[2] where tables or figures should be inserted in the text. ***To improve the quality of the graphs, the original files will be requested in a spreadsheet or in graph generation software. Colorful graphics are encouraged.***

Figures in digital format must be sent in separate files (*Do not send inside a text file, Word type or similar, which makes the quality of the images bad*). The size of the board must be proportional to the page mirror (23 x 17.5 cm), preferably not more than twice. For the numbering of the figures use Arial or Open Sans (11 pt), with the number placed on the right and below. This should only be applied to the boards when in their final publication size. The Arial or Open Sans font must also be used for labeling inserted in photos, drawings and maps (letters or numbers used to indicate names of structures, abbreviations, etc.), ***the use of another type of font may result in the refusal of the article / scientific communication***. ***The sending of colored figures is encouraged, improving the quality of the articles.***

All figures, diagrams, infographics, images, etc. ***they must present the source or authorship at the end of the legend.*** If none of the authors of the article is the author of the photo, it will be necessary to send a signed authorization granting the use of the image by EntomoBrasilis. The letter template can be found on the website. The letter must be signed by the author (s) of the photo and sent, ***in PDF format***, via e-mail to periodico@ebras.bio.br.

Acknowledgments must be listed at the end of the paper, immediately before References. It is suggested that the authors should be succinct and objective when possible, ***avoiding mentioning names that allow the identification of authorship, mainly***.

2.2. References

References to unpublished articles (in press), personal communication or unpublished data will not be accepted. Use recent references, giving preference to those published in the last 10 years, with a greater focus on those published in the last five years, when possible. We adopted a new form of citation with the exclusion of the period after the initial names and middle names of the authors in the references (Rodrigues, WC & Alencar, J)

2.2.1. Periodicals:

The journal title must be written in full. In https://app.entomobrasilis.org/JTAbbr it is possible to find hundreds of scientific journals with their abbreviated and full titles. Inform only the volume and pages of the article, that is, there is no need to inform the number. If there is a DOI, it must be informed as follows: *https://doi.org/prefixo/doi_do_artigo*.

Cassino, PCR & WC Rodrigues, 2005. Distribuição de Insetos Fitófagos (Hemiptera: Sternorrhyncha) em Plantas Cítricas no Estado do Rio de Janeiro. Neotropical Entomology, 34: 1017-1021. DOI: https://doi.org/10.1590/S1519-566X2005000600021

Dáttilo, W, EC Marques, JCF Falcão & DDO Moreira, 2009. Interações mutualísticas entre formigas e plantas. EntomoBrasilis, 2: 32-36. DOI: https://doi.org/10.12741/ebrasilis.v2i2.44

Souza, CM & ML Paseto, 2015. Description of a Neotropical New Species of *Oxysarcodexia* Townsend, 1917 (Diptera: Sarcophagidae). EntomoBrasilis, 8: 222-225. DOI: https://doi.org/10.12741/ebrasilis.v8i3.524

Zacca, T., MM Casagrande, OHH Mielke, B Huertas, EP Barbosa, AVL Freitas, G Lamas, M Espeland, C Brévignon, S Nakahara, MF Checa & KR Willmott, 2020. Systematics of the Neotropical butterfly genus *Paryphthimoides* Forster, 1964 (Lepidoptera: Nymphalidae: Satyrinae), with descriptions of seven new taxa. Insect Systematics & Evolution, 52: 42-96. DOI: https://doi.org/10.1163/1876312x-00001027

2.2.2. Books:

Del-Claro K & HM Torezan-Silingardi (Eds.), 2021. Plant-Animal Interactions: Source of Biodiversity. Springer. DOI: https://doi.org/10.1007/978-3-030-66877-8

Haddad, ML, JRP Parra & RCB Moraes, 1999. Métodos para estimar os limites térmicos inferior e superior de desenvolvimento de insetos. Piracicaba, FEALQ.

Schowalter, TD, 2006. Insect Ecology: an ecosystem approach, 2nd Ed. San Diego, Elsevier.

2.2.3. Book chapter:

Del-Claro K & HM Torezan-Silingardi, 2021. An Evolutionary Perspective on Plant-Animal Interactions, pp. 1-15. *In*: Del-Claro K & HM Torezan-Silingardi (Eds.). Plant-Animal Interactions: Source of Biodiversity. Springer. DOI: https://doi.org/10.1007/978-3-030-66877-8_1

Silva-Filho, R, PCR Cassino, EC Viegas & JC Perruso, 2004. "PIOLHO BRANCO" *Orthezia praelonga*, pp. 27-48. *In*: Cassino, PCR & WC Rodrigues (Eds.). Citricultura Fluminense: Principais pragas e seus inimigos naturais. Seropédica, EDUR.

2.2.4. Electronic publications:

If the publication has a DOI, include the link at the end of the reference.

Francini, RB & CM Penz, 2006. An illustrated key to male Actinote from Southeastern Brazil (Lepidoptera, Nymphalidae). Biota Neotropica, 6: BN00606012006. <http://www.biotaneotropica.org.br/v6n1/pt/abstract?identification-key+bn00606012006>. [Access: 31.iii.2014]. DOI: https://doi.org/10.1590/S1676-06032006000100013

Mariottini, Y, ML Wysieck & C Lange, 2010. The biology and some population parameters of the grasshopper, Ronderosia bergi, under laboratory conditions. Journal of Insect Science, 10: 92. Available in: <http://jinsectscience.oxfordjournals.org/content/10/1/92>. DOI: https://doi.org/10.1673/031.010.9201

2.2.5. Software:

Cowell, RK, 2019. EstimateS - Statistical estimation of species richness and shared species from samples. Version 9.1.0. Available in: <http://viceroy.eeb.uconn.edu/estimates>.

Rodrigues, WC, 2021. DivEs - Diversidade de espécies. Version 4.16.122.2105. Software e Guia do Usuário. AntSoft Systems On Demand. Available in: <http://dives.ebras.bio.br>.

R Development Core Team, 2021. R: A language and environment for statistical computing. R Foundation for Statistical Computing. Available in: <http://www.R-project.org>.

2. In the process of composing the text of the article / scientific communication, the position of the figure / table may change due to the better position in desktop publishing.

2.2.6. Bulletin:

Arioli, CJ, F. Molinari, M Botton & MS Garcia, 2007. Técnica de criação de *Grapholita molesta* (Busck, 1916) (Lepidoptera: Tortricidae) em laboratório utilizando dieta artificial para a produção de insetos visando estudos de comportamento e controle. Bento Gonçalves: EMBRAPA (Boletim de Pesquisa e Desenvolvimento, 13).

2.2.7. Dissertation/Thesis

Rodrigues, WC, 2001. Insetos entomófagos de fitoparasitos (Homoptera, Sternorrhyncha) de plantas cítricas no Estado do Rio de Janeiro: ocorrência e distribuição. Dissertation (Master in Agronomy: Phytotechnics). Universidade Federal Rural do Rio de Janeiro.

Rodrigues, WC, 2004. Homópteros (Homoptera: Sternorrhyncha) Associados à Tangerina CV. Poncã (Citrus reticulada Blanco) em Cultivo Orgânico e a Interação com Predadores e Formigas). Thesis (PhD in Agronomy: Phytotechnics). Universidade Federal Rural do Rio de Janeiro.

References to event abstracts are not allowed and citations of dissertations and theses should be avoided, but if has URL or DOI or handles, you can cited, only abstracts of events published in expanded form and / or as a supplement to periodicals will be accepted.

Conclusion of Course Papers are not accepted by EntomoBrasilis, as well as personal communications.

The citation of expanded abstracts and / or as a supplement to journals must respect the citation of articles.

The citations of expanded abstracts are limited to two (02) per article.

3. SCIENTIFIC NOTE

In Scientific Communications, the text should be read without dividing items (**Material and Methods**, **Results and Discussion**, **Reference**). Include the **Title**, **Abstract** followed by the **Keywords** on the first page. On the second page, start the text.

4. REVIEW ARTICLES (FORUM)

Review papers will be accepted at the discretion of the Editorial Board, remembering that only four Forums per year are limited.

Review articles should follow the following items: Title (in Portuguese or English or Spanish), Abstract and Abstract (following the rules of original articles) Introduction (omitting this term), Review, properly speaking, divided into topics and in logical sequence, before the **Acknowledgments** and **References**, it is allowed to include an item **Final Considerations**, however without characteristics of conclusions.

Figures, Tables, Infographics are welcome in review articles, as well as in Articles/Scientific Note, for details see item 2.1.

5. UNIT SYSTEM

EntomoBrasilis adopts the International System of Unit for unit of measures, and is based on the ***INMETRO*** resolution, nº 12 of 12.x.1988. In this way, the question should be referred to through the address http://www.inmetro.gov.br/resc/pdf/RESC000114.pdf. In this standard, only a few aspects related to the mentioned document will be addressed.

1. Thermal unit: only °C (degree Celsius) should be used, except in works developed in countries where K (degrees Kelvin) is used;
2. The unit of measurement must be presented with its symbol and not in full, as recommended by the resolution, eg, hours (h), minutes (min), meter (m), day (d), decibel (dB), hectare (ha), kilogram-force (kgf), horsepower (cv or hp), angstrom (Å), atmosphere (atm), neper (Np), rotation per minute (rpm), electronvolt (eV), Ton (t), degree (°), minute ('), second ("), liter (L or ℓ), parsec (pc), gray (Gy), becquerel (Bq), lux (ℓx), lumen (ℓm), candela (cd), weber (Wb), voltampère (VA), henry (H), farad (F), siemens (S), ohm (Ω), volt (V), watt (W), amp; (A), joule (J), Pascal (Pa), newton (N), hertz (Hz), etc;
3. When the value is written it must be separated from the unit, for example, 10 m, 10 L, 10 °C, 50 V, 25 W, 750 ℓx, 1,200 ha. The standard allows the use of space in tables, since this standard requires not only use in tables / tables, due to space limitations, but for the rest of the text the example above is maintained;
4. Except for this separation, the units of degree, minutes and seconds, either in the text or in tables / charts;
5. For English, the separation of thousands and decimals follows international standards, that is, the presentation of a value with thousands, the point of separation should appear, e.g., 1,200 ha. In the case of decimal we have 1.25 Hz and in the presence of both we have 1,250.85 L; and
6. The writing of numbers: values from zero to nine are written in full, except when followed by a unit, e.g., seven species in a place with a temperature of 5 °C or 17 species in a place with a temperature of 20 °C.

It is also recommended to read the document Translation of the publication of BIPM - Summary of the International System of Units - SI, available at: http://www.inmetro.gov.br/consumidor/pdf/resumo_si.pdf.

6. OTHER INFORMATION

Copies of the submitted text, together with the reviewers' opinions, will be sent to the corresponding author indicated at the time of submission of the article, so that the suggested corrections / changes can be made. ***Changes or additions to the text sent after your registration may be rejected. The entire process is carried out through the OJS.***

After the conclusion of the evaluation, that is, after the opinion of the Editor, the inclusion or removal of authors from the submission will not be allowed.

Reading proofs will be sent electronically to the corresponding author and must be returned, with the necessary corrections, in an attached document or through the OJS, in the requested time.

The proofs are sent in PDF format and can receive comments through the newest versions of the Adobe Reader™ or Foxit PDF Reader™ software, however it is suggested that the comments are also inserted in the Open Journal Systems (OJS).

The scientific content of the work as well as the observance of grammatical rules are the sole responsibility of the author (s), in any language contained in the text.

Authors are advised to consult the latest edition of the journal to verify the style and layout. ***When submitting the manuscript, the author may suggest up to three names of reviewers (who have Lattes Curriculum and preferably are Doctors) to analyze the work, sending: full name, address and e-mail. However, the final choice of consultants will remain with the Editor-in-Chief and / or the Section Editor.***

7. REPRINTS:

Reprints will not be provided. The articles will be available on the website of the EntomoBrasilis in PDF format, to be freely accessed (***Open Full Access***).

8. VOUCHER AND TYPE SPECIMENS:

Manuscripts must report the museums or the institutions where the specimens (**types or vouchers**) are deposited and respective deposit numbers whenever possible.

9. RESPONSIBILITY:

The grammatical and scientific content of the articles is the sole responsibility of the authors. The Editorial Board may suggest changes or even reject the publication of articles if the grammatical content is considered insufficient or not consistent with the scientific and grammatical language in which the text is found.

10. ETHICS COMMITTEE:

Research involving human beings and animals must present in the **Material and Methods** item, the number of the research approval protocol, the name of the committee and institution that is based / linked.

The omission of the data requested above will imply immediate refusal of the article / scientific note.

11. ARTICLE SUBMISSION

The submission of articles will be carried out only electronically, through the Journal Management System, the Open Journal Systems (OJS) (https://www.entomobrasilis.org), hosted on the website of the Entomologistas do Brasil project. For this, the author must register in the system and submit the file electronically in the form mentioned in the item Preparing the Manuscript.

12. FEE FOR LAYOUT, PUBLICATION AND INDEXATION

In 2020 we started a new way of charging for the layout, publication and indexing of articles / scientific note submitted to EntomoBrasilis. Initially, we standardized the values of communication and articles, but allowing figures and tables to be published without increasing the price.

Payment will be made through *PagSeguro*, and must be made within the period established by the bank slip. More information can be obtained at the link: https://app.entomobrasilis.org/PaymentInstruction.

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