ARTÍCULO DE INVESTIGACIÓN ORIGINAL

DIVERSITY OF MITES ASSOCIATED WITH ORNAMENTAL PLANTS

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Artículo de Investigación Original

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DIVERSIDAD DE ÁCAROS ASOCIADOS A LAS PLANTAS ORNAMENTALES

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ABSTRACT. This survey was conducted in Cascadura district, RJ- Brazil during March and May 2018 to access the mite diversity in four species/cultivars of ornamental plants of the families Asparagaceae. Leaves of four plant species (*Dracaena fragrans* (L.) (Ker Gawl, 1808), *Dracaena marginata* (Lam, 1786), *Cordyline terminales* (L.) (Kunth, 1754) and *Dracaena reflexa* (Lam, 1786) were sampled and a total of 14 mite species were collected, distributed in 13 genera and 12 families. From these, eight species are predators, two generalists and four phytophagous. The phytophagous mites sampled were *Brevipalpus essigi* (Baker, 1949), *Brevipalpus phoenicis* (Geijskes, 1939), *Tenuipalpus* sp., *Tetranychus* sp., while predators were *Cunaxa* sp., *Typhlodromus pyri* (Scheuten,1857), *Bdella* sp., *Camerobia* sp., *Asca grostali* (Walter, Halliday e Linquist, 1993), *Cheyletus malaccensis* (Oudmans, 1903), *Stigmaeus* sp., *Blattisocius tarsalis* (Berlese, 1918). Two generalists were sampled, namely *Glycyphagus domesticus* (De Geer, 1778), *Tarsonemoides* sp. The greatest similarity among ornamental plants were observed between *D. fragans* and *C. terminales* for the Jaccard coefficient. The results of this study are expected to be the basis for future studies of biological control with predatory mites.

Keywords: Arthropod; Biodiversity; Mite fauna, Plants; Pest mite.

RESUMEN. Este estudio se realizó en el distrito de Cascadura, RJ-Brasil durante marzo y mayo de 2018 para acceder a la diversidad de ácaros en cuatro especies/cultivares de plantas ornamentales de las familias Asparagaceae. Se muestrearon hojas de cuatro especies de plantas (*Dracaena fragrans* (L.) (Ker Gawl, 1808), *Dracaena marginata* (Lam, 1786), *Cordyline terminales* (L.) (Kunth, 1754) y *Dracaena reflexa* (Lam, 1786) y se recolectaron un total de 14 especies de ácaros, distribuidas en 13 géneros y 12 familias. De éstas, ocho especies son depredadoras, dos generalistas y cuatro fitófagas. Los ácaros fitófagos muestreados fueron *Brevipalpus essigi* (Baker, 1949), *Brevipalpus phoenicis* (Geijskes, 1939), *Tenuipalpus* sp., *Tetranychus* sp., mientras que los depredadores fueron *Cunaxa* sp., *Typhlodromus pyri* (Scheuten,1857), *Bdella* sp., *Camerobia* sp., *Asca grostali* (Walter, Halliday e Linquist, 1993), *Cheyletus malaccensis* (Oudmans, 1903), *Stigmaeus* sp., *Blattisocius tarsalis* (Berlese, 1918). Se muestrearon dos

generalistas, a saber, *Glycyphagus domesticus* (De Geer, 1778), *Tarsonemoides* sp. La mayor similitud entre plantas ornamentales se observó entre *D. fragans* y *C. terminales* para el coeficiente de Jaccard. Se espera que los resultados de este estudio sirvan de base para futuros estudios de control biológico con ácaros depredadores.

Palabras clave: Artrópodo; Biodiversidad; Fauna de ácaros, Plantas; Ácaro plaga.

INTRODUCTION

The use of exotic or native ornamental plants with a focus on decorating public spaces and homes grows every year. Ornamental plants can stand out for the beauty of the flowers, leaves, and other aspects of the plant (Damen *et al.,* 2018). However, since they are often under the effect of stress, due to polluted environments, soils without nutrients and planted in urban areas, they may have a greater predisposition to certain diseases, in addition to presenting greater infestation of phytophagous arthropods, when compared to plants from in rural areas (Fluckinger & Braun, 1999; Larcher, 2000). These plants are the ones that most collaborated with the propagation of mites and consequently impacting the economy (Bosa *et al.,* 2003; Daud *et al*. 2007). These data corroborate other studies carried out in different ecosystems, reporting the association of several arthropods in ornamental plants sold in commercial establishments, which can be disseminated to other areas through pots of infested plants (Campos-Farinha, 2006; Santos *et al.,* 2010; Sulzbach *et al.,* 2015; Castro & Montalvão, 2020).

The *Dracaena* genus has approximately 116 species, only six species are ornamental plants, with a wide distribution. Recent studies place the genus in the Asparagaceae family, but other have placed it in the Agavaceae or recognized it as a distinct family called Dracaenaceae. (Bos, 1998; Stevens, 2001; Lu & Morden, 2014; Damen *et al.*, 2018). Several species of the *Dracaena* genus are important for horticulture and floriculture (Damen *et al.*, 2018) while six species are commercially produced as ornamentals (*Dracaena deremensis* (L.) (Ker Gawl, 1808) *D. fragans*, *Dracaena godseffiana* (Sander ex Mast, 1893), *D. marginata*, *D. reflexa* e *Dracaena sanderiana* Sander ex Mast, 1895) (Zulfiqar *et al.,* 2019). Among the pests that cause damage to ornamental plants, mites and insects predominate (Mattiuz *et al.*, 2006).

The mite fauna is among the most diverse group on the planet. Many species inhabit different parts of plants and depending on the food habit, they feed on the plant itself, on fungi, algae, arthropods or decomposing organic matter (Lofego & Moraes, 2006).

Bosa *et al.* (2003) draw attention to the increased propagation of mites in ornamental plants, directly impacting the economy. In the few studies on species richness of mites on plants, it was observed that predatory mites are the main natural enemies of phytophagous mites.

There are few studies on species of mites associated with ornamental plants in urban regions in Brazil, among them the works of: Daud *et al*. (2007) who studied the mite fauna associated with *Bauhinia variegate* L., a species introduced in the Northwest of the State of São Paulo as an ornamental; Miranda *et al.* (2007), that reported ornamental plants hosting mites of the *Brevipalpus* genus in the Federal District, Feres *et al.* (2009) who studied the diversity of mites in 20 species of ornamental plants in the state of São Paulo; Santos *et al.* (2010) who described the association of mites in tropical ornamental plants in the Southern Coast of Bahia; and Castro & Vieira (2011) who evaluated the mite community associated with *Genipa americana* (Rubiaceae) on Ilha Solteira, São Paulo state. For an efficient and integrated management, it is essential to carry out a good survey of organisms and their occurrence in plant

species (Picanço, 2010; Fujihara *et al.*, 2016; Castro & Montalvão, 2020).

To provide more information about mites in ornamental plants, this study aimed to identify the diversity of mites that occur in urban plants of the *Dracaena* genus, in Cascadura, at Rio de Janeiro, RJ, Brazil.

Material and Methods

A survey was carried out in April and May 2018, in four species of ornamental plants of the *Dracaena* genus, namely *D. fragans*, *D. marginata*, *C. terminales* and *D. reflexa*, cultivated in a 220 m^2 garden located in the Cascadura district, municipality of Rio de Janeiro - RJ (-22.8828048S; -43.3385081W), Brazil.

Leaf samples were examined with a 10X lens, collected in polyethylene bags properly tied and taken to the Environmental and Health Education Laboratory- LEAS/IOC/FIOCRUZ. These samples were observed under a stereoscopic microscope and the mites were collected with the aid of a fine brush moistened with 70% ethyl alcohol. Representatives of the different morphospecies found in each sample were mounted on microscopy slides with Hoyer's medium (Flechtmann, 1975).

The identification of specimens was performed under a phase contrast microscope up to the level of genera and species. To analyze the diversity and uniformity of the mite fauna in the Dracaenas studied, the Shannon index (1948) was applied. Frequency (% of individuals of a species in relation to the total number of individuals), constancy (% of species present in the surveys carried out), abundance (number of individuals per unit of surface) and dominance (species when it has a frequency greater than 1/S, in which S is the total number of species in the community) were determinate. The ANAFAU program developed by the Entomology sector of ESALQ/USP was used to perform the analyses.

The analysis of similarity of species of the *Dracaena* genus was performed using the Jaccard index, which expresses the similarity between environments, based on the number of common species. The Jaccard index considers the number of common species between two areas (a) and the number of unique species in each area.

Results and Discussion

On four species of ornamental plants evaluated. Three species sampled belonging to the Tenuipalpidae family, and the other single-species families were Tetranychidae, Cunaxidae, Phytosiidae, Bdellidae, Camerobiidae, Ascidae, Cheyletidae, Stigmeidae, Blatisociidae, Glycyphagidae and Tarsonemidae. The greatest diversity of genus was verified for phytophagous with the family Tenuipalpidae with two genera *Brevipalpus* and *Tenuipalpus* (Donnadieu, 1875) and three species, and the family Tetranychidae with one genus *Tetranychus* (Dufour, 1832), all other families presented a single genus each (Fig. 1).

Tenuipalpus are popularly called flat mites, they have several species that cause damage to cultivated plants and are vectors of viruses (Moraes & Flechtmann, 2008). Among the Tenuipalpidae mites that were collected was the *Brevipalpus* genus with two species *B. essigi* (Baker, 1949) and *B. phoenicius* (Geijskes, 1939), being the most abundant genus collected among the phytophagous (94%). According to Ferreira *et al.* (2007), this group of mites is of great importance because they transmit viruses to plants, causing great economic loss, as they cause serious damage to cultivated plants.

Among phytophagous specimens, the most important is *Brevipalpus phoenicis*, a polyphagous species widely distributed in the world and known as the leprosis citrus mite (Musumecci & Rossetti 1963), zoned chlorosis (Rossetti *et al.*, 1965), coffee ring leaf spot (Chagas, 1978) and in passion fruit it acts as a vector of green spot (Kitajima *et al.*, 1997).

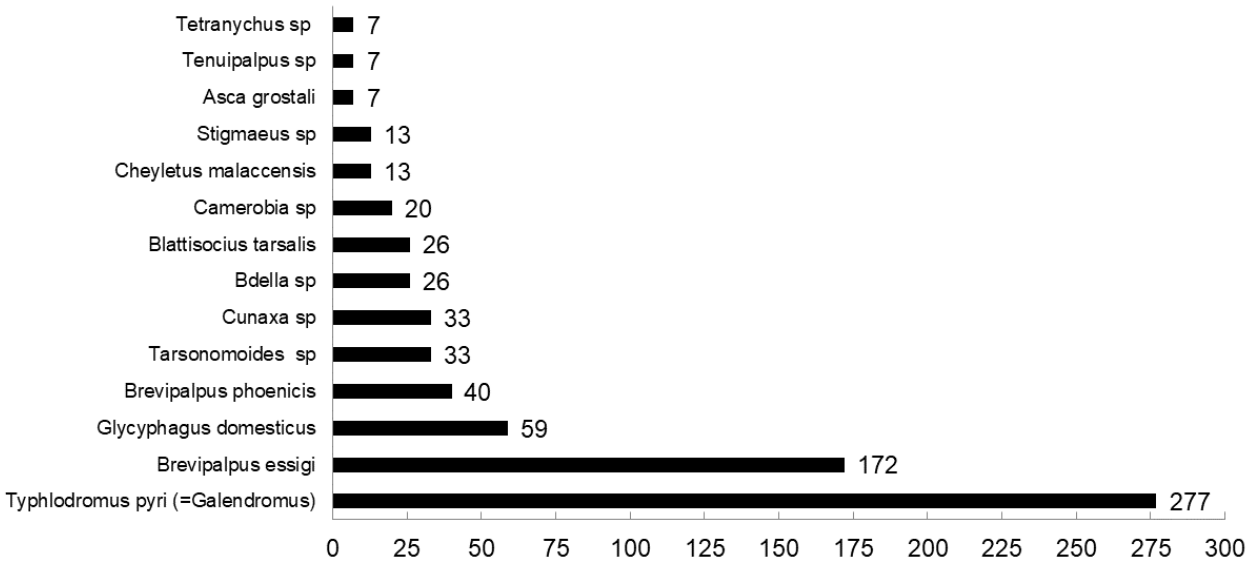

Figure 1. Total mite specimens found in *Dracaena* sp., in Cascadura/Rio de Janeiro/Brazil.

Ferreira *et al.,* (2007) were able to characterize a new bacilliform virus isolated from a creeping plant *Solanum violaefolium* L. (Solanaceae), used to cover soils in shady areas, transmitted by the mites *B. phoenicis* and *Brevipalpus obovatus* (Donnadieu, 1875). This virus induces ring spots on the leaves of plants affected by it. The other two species (*Tenuipalpus* sp, *Tetranychus* sp) represented only 3% of the phytophagous mites collected.

Mites of the Tetranychidae family are commonly known as spider mites, as some species weave webs, live in colonies and are considered pests of different agricultural and ornamental crops around the world (Zhang, 2003). According to Bolland *et al.* (1998), the species of these mites have a wide geographic distribution, in addition to an immense biological potential, as they live intrinsically related to the host plant.

Considering the 14 species found, the most common were predatory species with eight representatives, followed by four phytophagous and two generalist species. Among phytophagous mites, four species *B. essigi*, *B. phoenicis*, *Tenuipalpus* sp., *Tetranychus* sp. Among the predatory mites, eight species *Cunaxa* sp. (n=33), *T. pyri* (n=277), *Bdella* sp. (n=26), *B. tarsalis* (n=26), *Camerobia* sp. (n=20), *A. grostali* (n=7), *C. malaccensis* (n=13), *Stigmaeus* sp. (n=13) were recorded. The other species were categorized as generalists G. *domesticus* (n=59), *Tarsonemoides* sp. (n=33), as they belong to families with different or unknown feeding habits, such as: bacteriophages, algivores, detritivores, pollenophages and fungivores (Walter and O'dowd, 1995) (Fig.1, Fig. 2).

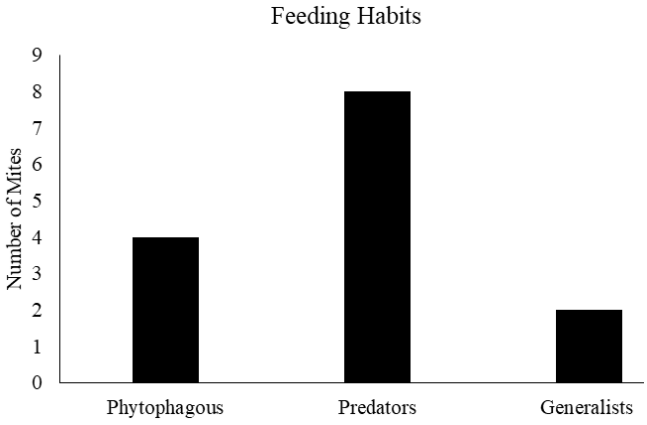

Figure 2. Feeding habits of mites collected on species of ornamental plants of the *Dracaena* genus, in Cascadura/Rio de Janeiro/Brazil.

Considering all species of ornamental plants studied, two species of mites were considered predominant: the phytophagous mite *B. essigi* and the phytoseiid predatory *T. pyri*, the first being

classified as dominant (D) and very frequent (VF) and the second as super dominant (SD) and super frequent (SF). All other species were considered dominant (D), but the species *A. grostali*, *Tenuipalpus* sp, *Tetranychus* sp. were considered infrequent (IF), with the same number of individuals (Table 1).

Table 1. Dominance classes, abundance, frequency, and constancy of mite species collected on ornamental plants of the *Dracaena* genus collected in a garden in Cascadura district in the State of Rio de Janeiro, Brazil.

Mite Species	Total (1)	Dominance(2)	Abundance(3)	Frequency(4)	Constancy(5)
Cunaxa sp	33	D	C	F	W
**Brevipapus essigi*	172	D	VA	MF	W
Brevipalpus phoenicis	40	D	C	F	W
**Typhlodromus pyri (=Galendromus)*	277	SD	SA	SF	W
Bdella sp	26	D	C	F	W
Glycyphagus domesticus	59	D	C	VF	W
Cheyletus malaccensis	13	D	C	F	W
Stigmaeus sp	13	D	C	F	W
Tarsonomoides sp	33	D	C	F	W
Asca grostali	7	D	D	IF	W
Tetranychus sp	7	D	D	IF	W
Tenuipalpus sp	7	D	D	IF	W
Camerobia sp	20	D	C	F	W

Total individuals= 733; Number of species= 14; Number of collections= 2; Shannon-Weaner Index= 2.0849; Confidence Interval of H (p=0.05) = [2.080570; 2.089165]; Wealth Index (Margalef) = ALPHA = 1.9600; Uniformity or Equitability Index = E = 0.8128; *Predominant species; (1) Total specimens collected; (2) D= dominant; SD= super dominant; (3) VA= very abundant; SA= super abundant; A=abundant; C=common; D= disperses; (4) F=Frequent; VF= Very Frequent; SF= super frequent; IF= infrequent; (5) W= constant.

After analyzing the plants, there were 375 individuals of nine species of mites on *C. terminales* with a corresponding diversity index (H) of 1.7453. The predatory species *T. pyri* was classified as super dominant (SD), also being the most super frequent (SF) and abundant, representing 32% of the mites collected on this plant. In the same plant, the phytophagous mites *B. essigi* and generalist *G. domesticus* were classified as dominant (D), very abundant (VA) and constant (W), but in terms of frequency, the species *B. essigi* was classified as very frequent (VF) and *G. domesticus* as frequent (F), these mites represented 6.3% and 5.4%, respectively, of the mites collected (Table 2).

Table 2. Dominance classes, abundance, frequency, and constancy of mite species associated with ornamental plants D. fragans, D. marginata, C. terminales and D. reflexa, collected in a garden in Cascadura District in the State of Rio de Janeiro in the months of April and May of 2018.

Mite Species	Plants	Total(1)	Dominance(2)	Abundance(3)	Frequency(4)	Constancy(5)
Cunaxa sp	*Dracaena fragans*	26	D	C	F	W
	Dracaena marginata	0	0	0	0	0
	Cordylane terminales	7	D	C	F	W
	Dracaena reflexa	0	0	0	0	0
**Brevipapus essigi*	**Dracaena fragans*	60	D	VA	VF	W
	**Dracaena marginata*	66	D	VA	VF	W

	**Cordylane terminales*	46	D	VA	VF	W
	Dracaena reflexa	0	0	0	0	0
	Dracaena fragans	7	D	C	F	W
**Brevipalpus*	*Dracaena marginata*	7	D	C	F	W
phoenicis	*Cordylane terminales*	6	D	C	F	W
	**Dracaena reflexa*	20	D	VA	VF	W
	Dracaena fragans	7	D	C	F	W
**Typhlodromus*	*Dracaena marginata*	13	D	C	F	W
pyri	**Cordylane terminales*	237	SD	SA	SF	W
(=Galendromus)	**Dracaena reflexa*	20	D	VA	VF	W
	Dracaena fragans	7	D	C	F	W
Bdella sp	*Dracaena marginata*	0	0	0	0	0
	Cordylane terminales	7	D	C	F	W
	Dracaena reflexa	12	D	C	F	W
	Dracaena fragans	13	D	C	F	W
	Dracaena marginata	0	0	0	0	0
**Glycyphagus*	**Cordylane terminales*	39	D	VA	F	W
domesticus	*Dracaena reflexa*	7	D	R	IF	W
	Dracaena fragans	7	D	C	F	W
Cheyletus	*Dracaena marginata*	6	D	C	F	W
malaccensis	*Cordylane terminales*	0	0	0	0	0
	Dracaena reflexa	0	0	0	0	0
	Dracaena fragans	13	D	C	F	W
Stigmaeus sp	*Dracaena marginata*	0	0	0	0	0
	Cordylane terminales	0	0	0	0	0
	Dracaena reflexa	0	0	0	0	0
	Dracaena fragans	0	0	0	0	0
Tarsonomoides sp	*Dracaena marginata*	26	D	c	F	W
	Cordylane terminales	0	0	0	0	0
	Dracaena reflexa	7	D	R	IF	W
	Dracaena fragans	0	0	0	0	0
Asca grostali	*Dracaena marginata*	0	0	0	0	0
	Cordylane terminales	0	0	0	0	0
	Dracaena reflexa	7	D	r	IF	W
	Dracaena fragans	0	0	0	0	0
Blattisocius tarsalis	*Dracaena marginata*	7	D	C	F	W
	Cordylane terminales	19	D	C	F	W
	Dracaena reflexa	0	0	0	0	0
	Dracaena fragans	0	0	0	0	0
Tetranychus sp	*Dracaena marginata*	0	0	0	0	0
	Cordylane terminales	7	D	C	F	W
	Dracaena reflexa	0	0	0	0	0
	Dracaena fragans	0	0	0	0	0
Tenuipalpus sp	*Dracaena marginata*	0	0	0	0	0
	Cordylane terminales	7	D	C	F	W
	Dracaena reflexa	0	0	0	0	0
	Dracaena fragans	0	0	0	0	0
**Camerobia sp*	*Dracaena marginata*	0	0	0	0	0
	Cordylane terminales	0	0	0	0	0
	**Dracaena reflexa*	20	D	VA	VF	W

Mites in *D. fragans* - Total individuals= 140; Number of species= 8; Number of collections= 2; Shannon-Weaner index=1.7163; Confidence Interval of H (p=0.05) = [1.704094; 1.728542]; Wealth Index (Margalef) = ALPHA = 1.4165; Uniformity or Equitability Index = E = 0.8254; *Predominant species.
Mites on *D. marginata* - Total individuals= 125; Number of species= 6; Number of collections= 2; Shannon-Weaner index=1.3804; Confidence Interval of H (p=0.05) = [1.366674; 1.394203]; Wealth

Index (Margalef) = ALPHA = 1.0339; Uniformity or Equitability Index = E = 0.7704; *Predominant species. Mites on *C. terminales* - Total individuals= 375; Number of species= 9; Number of collections= 2; Shannon-Weaner index=1.7453; Confidence Interval of H (p=0.05) = [1.734331; 1.756178]; Wealth Index (Margalef) = ALPHA = 1.4145; Uniformity or Equitability Index = E = 0.8393; *Predominant species. Mites on *D. reflexa* - Total individuals= 93; Number of species= 7; Number of collections= 2; Shannon-Weaner index=1.8417; Confidence Interval of H (p=0.05) = [1.832512; 1.850834]; Wealth Index (Margalef) = ALPHA = 1.3206; Uniformity or Equitability Index = E = 0.9464; *Predominant species. (1) Total specimens collected; (2) D = dominant; SD= super dominant; (3) VA = very abundant; SA = super abundant; C = common; R = rare; (4) F = Frequent; FV= Very Frequent; SF= super frequent; IF= infrequent; (5) W = constant.

In the ornamental plant *D. fragans*, 140 individuals of eight species of mites were found with a diversity index of 1.4165, being the most predominant phytophagous mite species *B. essigi* with 8.2% of individuals collected, classified as dominant (D) very abundant (VA), very frequent (VF) and constant (W) (Table 2), on the same plant, mites of the species *Cunaxa* sp. (3.6%), *B. phoenicis* (0.9%), *T. pyri* (0.9%), *Bdella* sp. (0.9%), *G domesticus* (1.8%), *C. malaccensis* (0.9%), and *Stigmaeus* sp. (1.8%) were classified as dominant (D), common (C), frequent (F) and constant (W). (Table 2).

In the species *D. marginata* 120 individuals with six species of mites were found, with a diversity index (H) of 1.3804. The largest number of species found was *B. essigi* with 9.0%, being considered dominant (D), very abundant (VA), very frequent (VF) and constant (W), in smaller amounts species *B. phoenicis*, *C. malaccensis* and *B. tarsalis* were found, in a concentration of 0.9%, and *T. pyri* with 1.8% and *Tarsonomoides* sp. with 3.6%, all considered dominant (D), frequent (F), common (C) and constant (W). No super dominant, super abundant or super frequent species were found in this plant (Table 2).

In *D. reflexa*, 93 individuals of seven species were collected. The corresponding diversity index (H) was 1.8417. *B. phoenicis*, *T. pyri* and *Camerobia* sp. were found in a concentration of 2.7% in the plant, being considered predominant species.
These specimens were classified as dominant (D), very frequent (VF), very abundant (VA) and constant (W). *Bdella* sp. was found in the plant with 1.8% of individuals, it was considered dominant (D), common (C), frequent (F) and constant (W), the other three species *G. domesticus*, *Tarsonomoides* sp. and *Asca grostali* were found with 0.9% of individuals in the plant, being considered dominant (D), common (C), frequent (F), rare (R) and constant (W) (Figure 3 and Table 2).

All *Dracaena* samples studied had mites with great potential to become major pests for this garden. Predators comprised most specimens (56.6%), followed by phytophagous with 30.8% and generalist mites with 12.6% of the total number of individuals collected.
The family of predatory mites best represented was the Phytoseiidae with the species *T. pyri* with 66.7% of the total predators collected. It was collected in the four plants studied (Table 2). The same was observed by Oliveira *et al.* (2011), who studied the plants *Heliconia* spp. (Heliconiaceae), *Etlingera* spp. (Zingiberaceae), and *Zingiber spectabile* Griff cultivated in different backyards in the State of Maranhão, found that mites belonging to the Phytoseiidae family were present in greater number of species.

Possibly, the increase in this family suggests that there is a natural control of arthropod pests by these predators in these crops (Oliveira *et al.*, 2011). Another factor that must be considered, according to Barba *et al.* (2019), is that the increase in predators, *T. pyri*, is highly influenced by the density of trichomes and domatia leaf in the axils of the plant's veins. Although there are few studies on the richness of mites on plants, the results show that the greatest enemies of phytophagous mites are predatory mites (Feres *et al.*, 2009).

Regarding the attack of mites on the plant *D. reflexa*, despite having presented the highest diversity index among the others studied, it presented the smallest number of individuals (93), with seven species of mites, being the only phytophagous mite collected *B. phoenicis*. Some factors can cooperate for the growth or reduction of the mites that live on ornamental plants, as an example we can mention the natural enemies, the climate, the physiological process of the host plants and the nutritional factor (Lofego & Moraes, 2006).

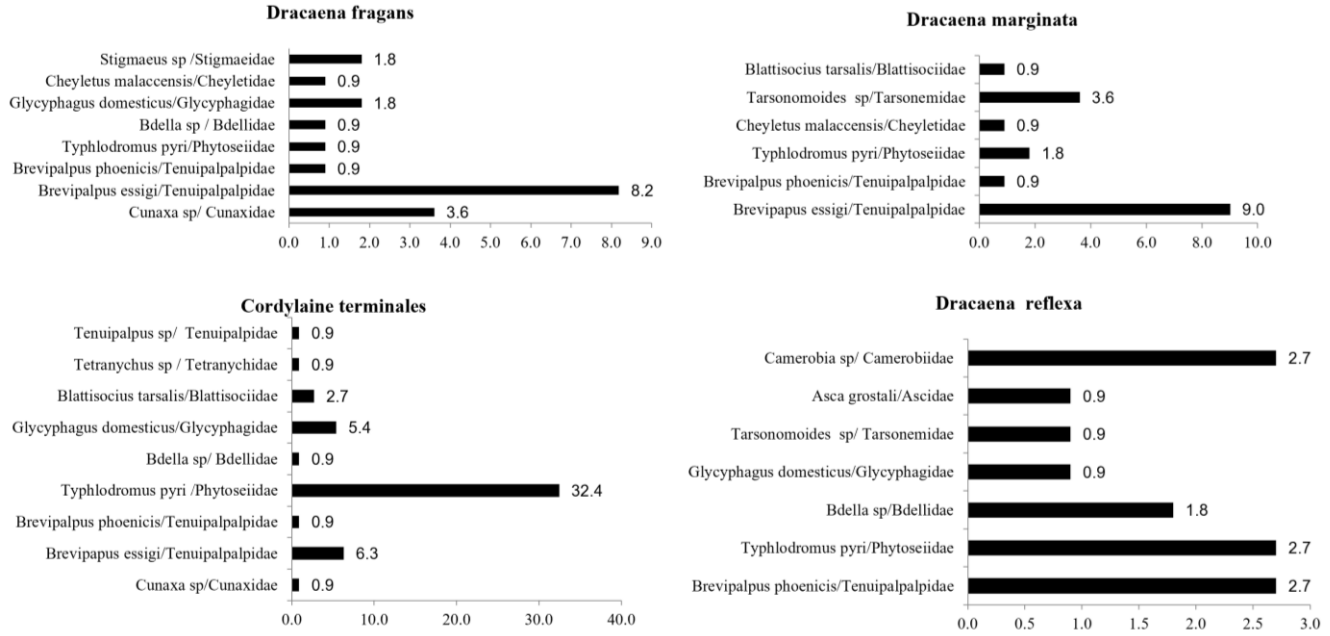

Figure 3: Diversity of mites (%) associated with ornamental plants *D. fragans*, *D. marginata*, *C. terminales* and *D. reflexa*, in Cascadura district in the State of Rio de Janeiro, Brazil.

Regarding the total number of specimens collected, it was observed that there was a predominance of mites on the plant of the species *C. terminales* with a total of 375 individuals, in relation to the other species studied. This species presented four specimens of phytophagous mites, including a species of the red mite *Tetranychus* sp. This fact was also observed by Santos *et al.* (2010), when studying mites on ornamental plants in the southern coastal region of Bahia. They identified that mites of the Tetranychidae family represented 15% of the total mites collected. According to Moraes & Flechtmann (2008), this family occurs in many plants, and it is of great economic importance in Brazil. Santos & Santos (2014), when studying mites on existing plants and squares and gardens, also observed a greater number of mite attacks on plants of the species *Coleus blumei* L. (Lamiaceae) and *Buxus sempervirens* L. (Buxaceae) with 65% of the sample values, in relation to the other families studied. Mites can present from predatory habits and other food resources such as fungi, pollens, sweet secretions, which makes the colonies remain in cultivated places even when the number of preys is reduced (Moraes & Flechymann, 2008). Then, we have the species *D. fragans*, with a total of 140 mites of eight species collected, which were presented as follows, phytophagous were the majority 9.1% with two species *B. essigi* and *B. phoenicis*, followed by predators with a total of 8.1%, with *Cunaxa* sp. being responsible for 3.6% of these predators (Table 2).

One hundred and forty individuals of eight species of mites were found in the ornamental plant *D. fragans* with a diversity index of 1.4165, being the most predominant phytophagous mite species *B. essigi* with 8.2% of individuals collected, classified as dominant (D) very abundant (VA), very frequent (VF) and constant (W). (Table 2), on the same plant, mites of the species *Cunaxa* sp (3.6%), *B. phoenicis* (0.9%), *T. pyri* (0.9%),

Bdella sp (0.9%), *G domesticus* (1.8%), *C. malaccensis* (0.9%), and *Stigmaeus* sp (1.8%) were classified as dominant (D), common (C), frequent (F) and constant (W). (Table 2).

The lowest diversity index (H) was the species *D. marginata* with 1.3804, with 125 individuals distributed among six species, whose community on the leaves was presented as follows: three species were predators (*B. tarsalis*, *C. malaccensis* and *T. pyri*), and were below 2% in this plant, a generalist *Tarsonemoides* sp. with 3.6%, being higher than the predators, and two phytophagous species, with the species *B. essigi* in greater number, with 9 % (Table 2).

In the collections carried out throughout the two months (April and May), there was no difference in fluctuation between individuals collected during the work period. It is believed that these differences are accentuated when the acarological inventories occur over a longer period. Lofego & Moraes (2006) found variations in mite colonies throughout the year, but in the summer and autumn seasons, no super dominant, super abundant or super frequent species were observed, with the highest diversity index being observed in this period. It is possible that some natural phenomenon occurs during this period that acts on the reproduction of these more numerous mites, causing them to disappear and give way to species of little occurrence of lesser importance (Santos & Santos, 2014).

Another factor is that due to the plants being in an urban environment, they may be under stress, and this causes a greater concentration of nitrogen in the leaves (White, 1984; Larcher, 2000). According to White (1984), this increases in nitrogen in the leaves can become a better source for the survival and development of phytophagous arthropods. Despite the plants studied being in a garden in an urban area, the collections were different because the highest percentage of mites collected was from predators with 415 individuals, representing 57% of the total mites collected. Many groups of mites are agricultural pests that affect the country's economy (Yanninek & Moraes, 1991), and others are natural enemies of pests that act in their control (Moraes *et al.*, 1986).

Jaccard's analysis indicated that the greatest similarity between the mite species was between the ornamental plants *D. fragans* and *C. terminales*, ranging from 0.00 to 0.55 (Table 3).

Table 3 - Similarity matrix obtained through the Jaccard coefficient of the mite species associated with the ornamental plants *D. fragans*, *C. terminales*, *D. marginata* and *D. reflexa*.

Plants	*D. fragans*	*C. terminales*	*C. marginata*	*D. reflexa*
D. fragans	1	-	-	-
C. terminales	0,50	1	-	-
D. marginata	0,40	0,36	1	-
D. reflexa	0,36	0,33	0,30	1

This index also took into account the abundance of mite species among plants, showing two main groups: the group of plants of the species *D. fragans* with one hundred and forty individuals of eight species of mites, with the most predominant phytophagous mite species being *B. essigi* with 8.2% of individuals collected, with Equitability index = E = 0.8254, and the group of the plant *C. terminales* with three hundred and seventy-five individuals of nine species, being the predatory species *T. pyri* classified as super dominant with 32% of the mites collected, and the phytophagous species *B. essigi* with 6.3%, classified as very frequent, with Equitability index = E = 0.8393. According to Cruz *et al.* (2012a), some plants have a richness of phytophagous mites, which would probably explain the great diversity of predatory mites on the ornamental plants studied. This is because the prey that feed on these plants are accessible, and not because of the morphological or reproductive characteristics that would attract the diversity of predatory mites (Cruz *et al.*, 2012b).

CONCLUSION

The inventory of mites in ornamental plant cultivation is of great importance due to the risk

of introducing pest mite infested plants. This demonstrates the importance of this research, and the need for taxonomic and diversity studies on the population of mites associated with these plants.

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