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Host specificity and aggregation for a widespread mistletoe in Campo Rupestre vegetation☆

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ABSTRACT

Assessment of host infection and distribution patterns are crucial to understand the underling mechanisms that shape parasitic plant spread in natural ecosystems. However, such data remain scarce for mistletoes inhabiting Brazilian *campo rupestre* vegetation, old-growth montane fire-prone grasslands. We evaluated the host range and distribution patterns of the mistletoe *Psittacanthus robustus* (Loranthaceae) at seven 1-ha plots located at in Serra do Cipó, southeastern Brazil. We investigate if the frequency of parasitism by *P. robustus* is directly related to the relative abundance of host tree species in the community, and how prevalence and intensity of infection vary among different host tree species. Average mistletoe density was 120 individuals ha^{-1}, which parasitized eight host species, including trees and shrubs in five families. Four tree species, *Vochysia thyrsoidea*, *Qualea cordata* (Vochysiaceae), *Trembleya laniflora* and *Miconia ferruginata* (Melastomataceae), comprised 95% of infected individuals. Twenty two percent of 1,108 trees sampled were parasitized by *P. robustus*, with host specificity within species in Myrtales Clade. Prevalence increased with host height for all tree species, with a highly aggregated distribution in few taller host trees within rocky outcrop patches in *campo rupestre*. The unveiling patterns of host infection and mistletoe distribution, support future studies addressing plant-plant, bird-plant and fire-plant interactions that might shape infection dynamics of this widespread mistletoe species in *campo rupestre*.

1. Introduction

Obligate parasitic flowering plants, popularly known as mistletoes, attach to the hosts' aerial shoots via a specialized root called haustorium (Calder and Bernardt, 1983). Most species are hemiparasites, obtaining water and mineral nutrients from the hosts' xylem, but photosynthesizing most of their own carbohydrates (Ehleringer et al., 1985). Host compatibility relates to physiological and morphological adaptations that allow seeds overcome hosts' chemical (Hoffmann et al., 1986) and mechanical (Medel, 2000) defensive traits to establish effective vascular connection (Yan, 1993). Mistletoe species varies in their host specificity, with some parasitizing only few host species within one genera or family, whereas others are highly generalists infecting a wide range of hosts including native and exotic species (Norton and Carpenter, 1998).

Understanding patterns of distribution and host infection is the first step to formulate hypothesis regarding underling mechanisms that shape parasitic plant spread in natural ecosystems. Mistletoe distribution is influenced by the interactions with their host plants (Sargent, 1995; López de Buen and Ornelas, 2002), with their avian seed dispersers (Watson and Rawsthorne, 2013) and by the environmental conditions (Botto-Mahan et al., 2000; Hist et al., 2011). Consistent patterns of mistletoe distribution and host infection have been reported for distinct species across ecosystems worldwide. For instance, their distribution is usually highly clumped on hosts, often on those larger and taller (Aukema and Martinez del Rio, 2002a; Roxburgh and Nicolson, 2007). At the landscape scale, their distribution is usually aggregated in some vegetation patches (Aukema, 2004; Hist et al., 2011).

Mistletoes comprise important elements of the vegetation in Brazilian ecosystems (Arruda et al., 2012). However, their patterns of distribution and infection of hosts has been investigated for few species in Brazilian savannas (Arruda et al., 2006; Mourão et al., 2006; Fadini and Lima, 2012; Genini et al., 2012). The woody mistletoe *Psittacanthus robustus* Mart. is a geographically widespread

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species in savannas of Central and South-eastern Brazil (Rizzini, 1980). It is known to parasitize 12 host species of Vochysiaceae and two species of Melastomataceae throughout its geographic range (Monteiro et al., 1992; Teodoro et al., 2010; Scalon et al., 2013). Indeed, this species usually presents a clumped distribution on the vegetation and infects the uppermost portions of taller host trees (Teodoro et al., 2010), with the population dynamics directly affected by fire occurrence (Teodoro et al., 2013). This mistletoe is one of the most conspicuous parasitic plant in the landscapes encompassing Rupestrian Grasslands or *campo rupestre* (*CR* hereafter), the Brazilian old-growth montane fire-prone vegetation mosaics with remarkable plant diversity and endemism (Silveira et al., 2016). Indeed, this species seem to play a keystone role as resource for insect herbivores (Guerra et al., 2011) and nectarivorous birds (Guerra et al., 2014) in *CR* vegetation. However, patterns of mistletoe distribution and host infection remain poorly explored in these megadiverse and endangered ecosystems (Silveira et al., 2016).

In this study we assessed host range and distribution of the mistletoe *P. robustus* in an area of *CR* in Serra do Cipó, South-eastern Brazil. We estimated *P. robustus* frequency of infection, as the fraction of infected trees of a given species from total infected trees sampled; infection prevalence, as the fraction of infected trees from all trees sampled for a given host species; and intensity of infection, as the number of mistletoes per infected tree for a given host species. We evaluated the spatial distribution of this mistletoe at the host tree and vegetation scales, and the relationship between host tree size and infection parameters (i.e. prevalence and intensity). In addition, we specifically addressed the following questions: (1) Is the frequency of parasitism by *P. robustus* directly related to the relative abundance of host tree species in the community? (2) How prevalence and intensity of infection vary among different host tree species?

2. Methods

2.1. Area description

We conducted this study at a private area in the vicinity of Serra do Cipó National Park (43° 35′W, 19° 17′S), a mountain formation that is part of the Espinhaço Range in Eastern Brazil. The main vegetation at mountain tops is the *CR*, with plant communities establishing on quartzite-derived rocks, with shallow, acid, sandy and extremely nutrient-impoverished soils, mostly above 900 m asl (Silveira et al., 2016). The vegetation is characterized by a mosaic formed by patches of small tortuous trees growing on rocky outcrops and boulders, among a variety of shrubby species amidst a well-developed herbaceous stratum, and patches of natural grasslands, with herbs and shrubs sparsely distributed. The climate is markedly seasonal with rainy summers and dry winters. Mean monthly temperature ranges from 8 °C in July to 29 °C in February, and mean annual precipitation is nearly 1400 mm (Madeira and Fernandes, 1999). Altitudes at the study site vary from nearly 1100–1300 m asl.

2.2. Field procedures

We systematically set seven 1-ha (100 × 100 m) plots located 100 m apart from each other along a 2-km trail including *campo rupestre* vegetation. Between June and December 2007, we randomly selected a plot at monthly intervals in which we extensively surveyed mistletoes on potential host plants, including shrubs, herbs, vines and trees. To estimate *P. robustus* infection prevalence and intensity of infection we considered only those tree species that were previously observed as the most common host at the study site. Then, for each of these host tree species taller than 0.5 m, we recorded species identity, presence and number of *P. robustus* individuals, tree height (TH; the distance from trunk base to canopy top) using a measuring pole and trunk base diameter (TBD; measured at soil height using a diameter tape, Forestry Suppliers ©). All trees within the plot were carefully inspected for detection of mistletoes, and inspection time varied from few seconds to up to 30 min according to host tree size and number of mistletoes. We climbed those larger trees for a closer inspection and we also utilized and 8 × 24 binoculars to search for mistletoes in the canopy of trees from the ground. We could count mistletoes accurately since most trees are usually small (> 5 m) and because mistletoes are conspicuous (Fig. 1), do not present epicortical secondary roots and the haustorium connects to hosts by single stem (Fig. 1ab). We considered only live mistletoes individuals, including established seedlings larger than 5 cm in height.

2.3. Statistical analyzes

To evaluate the effectiveness of the sampling effort in determining *P. robustus* host range at the study site, we constructed a rarefaction curve based on infected individuals found inside sampling plots. We compared the observed number of host species to an estimated value, obtained by first order Jackknife estimator after 1000 randomized samplings with replacement, utilizing the program *EstimateS* 9.0 (Colwell, 2013). To determine the degree of mistletoe aggregation at landscape scale we utilized the variance/mean ratio for abundances found on plots following Krebs (1989). To determine the degree of mistletoe aggregation at host tree scale we fitted observed distribution to expected negative binomial distribution for each host species, using chi-square goodness-of-fit test according to Krebs (1989). This statistical approach is commonly utilized to describe aggregation of plant parasites within hosts (Aukema and Martinez del Rio, 2002b; Medel et al., 2004). We utilized G-test to evaluate whether the frequency of parasitism on distinct host tree species corresponded to their relative abundance at the study site. Because host size had a strong effect on prevalence, to evaluate the correspondence among parasitism frequency and relative abundance, we excluded all trees with TH inferior to the shortest tree infected for each host species. We found significant positive correlations among TH and TBD for all tree species (log transformed data; *V. thyrsoidea*: $R^2 = 0.65$, $P < 0.0001$, $n = 671$; *Q. cordata*: $R^2 = 0.63$, $P < 0.0001$, $n = 87$; *T. laniflora*, $R^2 = 0.47$, $P < 0.0001$, $n = 188$; *M. ferruginata*: $R^2 = 0.62$, $P < 0.0001$, $n = 162$). Therefore, to conduct the analyzes we used only TH. To determine differences in intensity of infection among host species we utilized the non-parametric Kruskal-Wallis test. The relationship among infection intensity and TH was evaluated separately for each host species using non-parametric Spearman rank correlations. We used logistic regressions to evaluate the effect of plant size (TH) on probability of infection for each host species. We used multiple regression models to assess the combined effects of tree density and mean tree height on (1) mistletoe density on plots and (2) mistletoe prevalence on plots, in two separate models. We performed statistical analyzes after checking the assumptions of normality and variance homogeneity in STATISTICA 7.0 (StatSoft, 2004). The significance level adopted for all analyzes was $\alpha = 0.05$ and all analyzes were performed according to Zar (2010).

3–Results

3.1. Host range

We observed *P. robustus* parasitizing eight species within five families inside sampling plots. Four tree species were the most

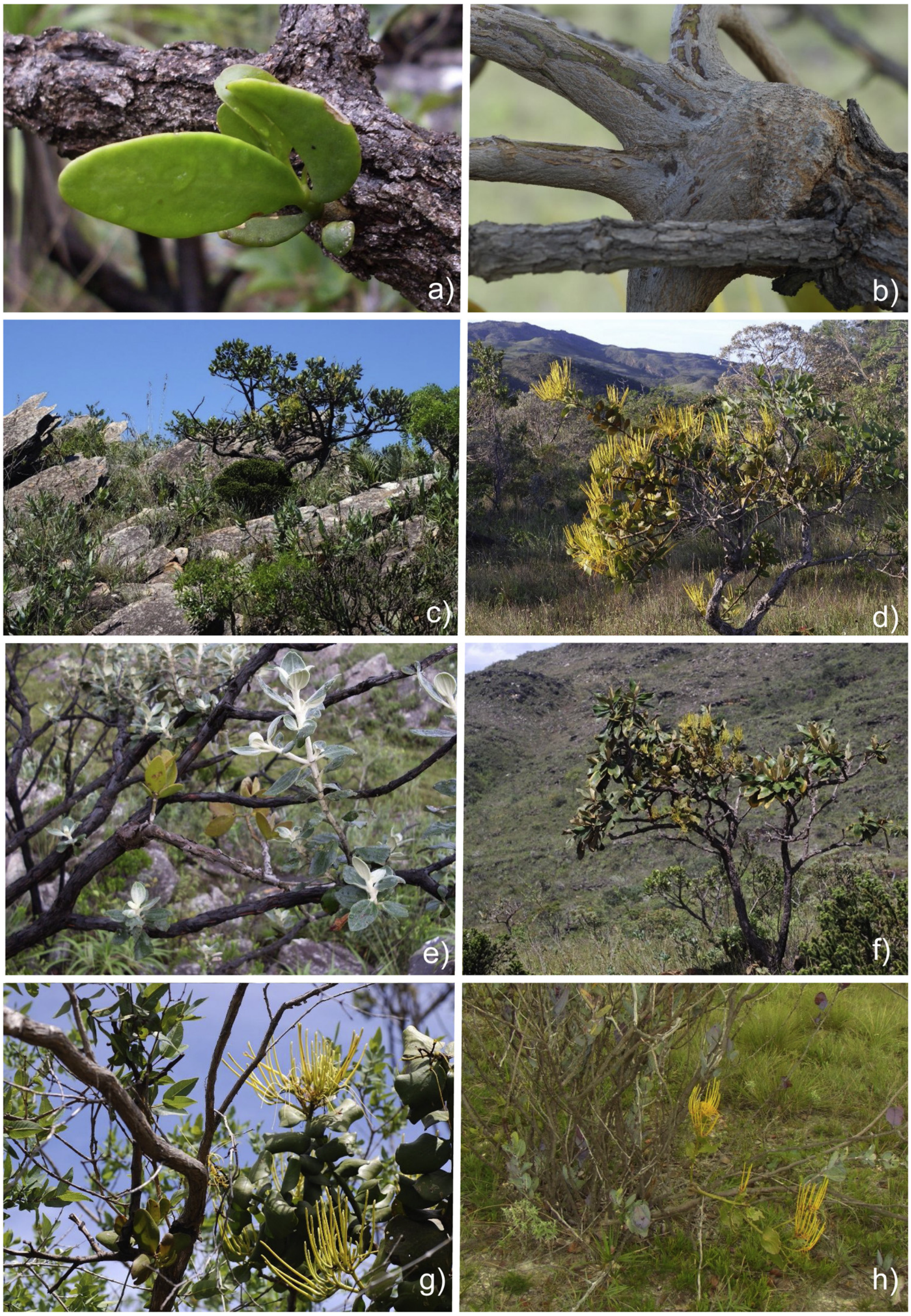

Fig. 1. The mistletoes *Psittacanthus robustus* develops its haustorial root from the radicle during seedling establishment (a) and individuals attach to a single stem of the host (b). In campo rupestres vegetation this mistletoe infect different tree species including; *Vochysia thyrsoidea* (c), *Qualea cordata* (d), *Trembleya laniflora* (e), *Miconia ferruginata* (f), *Campomanesia adamantium* (g) and *Coccoloba cereifera* (h).

common hosts among 255 infected plants recorded: *Vochysia thyrsoidea* Pohl (infection frequency 56%, Fig. 1c), *Qualea cordata* Spreng. (19%, Fig. 1d) (Vochysiaceae), *Trembleya laniflora* Cong. (15%, Fig. 1e) and *Miconia ferruginata* DC. (4%, Fig. 1f) (Melastomataceae). In addition, we found *P. robustus* parasitizing sporadically other four shrub species, including six individuals of *Vochysia elliptica* Mart., three individuals of *Campomanesia adamantium* Blume (Myrtaceae, Fig. 1g), one individual of *Diplusodon hirsutus* DC (Lythraceae) and two individuals of *Coccoloba cereifera* Schawcke (Polygonaceae, Fig. 1h). We also recorded other two host species on nearby areas outside sampling plots, the tree *Qualea dichotoma* (Mart.)Warm and the shrub *Miconia albicans* Steud., indicating that *P. robustus* host range in *campo rupestre* at Serra do Cipó reach at least 10 species. The rarefaction curve for *P. robustus* reached an asymptote of eight host species after nearly 200 infected individuals sampled (Fig. 2). Host species richness estimated was 9.1 ± 1.0 (Mean ± SD), indicating that our sampling effort was effective in assessing *P. robustus* host range in *campo rupestre* vegetation at Serra do Cipó.

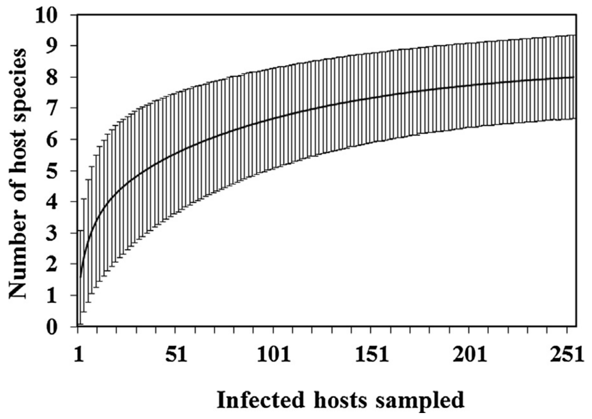

Fig. 2. Individual-based rarefaction curve for host species richness of *Psittacanthus robustus* in *campo rupestre* vegetation, Serra do Cipó, South-eastern Brazil.

3.2. *Mistletoe distribution*

Density of *P. robustus* varied from two to 342 individuals (mean ± SD, 120 ± 113 plants ha^{-1}) and was not related to tree density or mean tree height on plots ($F_{2,4} = 0.75$, $R^2 = 0.27$, $P = 0.52$). Variance/mean ratio (= 106) was significantly larger than one ($P < 0.001$), indicating that mistletoe distribution is highly aggregated at *campo rupestre* vegetation. Distribution within hosts was also highly aggregated, with most trees uninfected, most infected plants parasitized by few mistletoes and just a small fraction of host trees heavily parasitized (Fig. 3a). The low *k* values in the negative binomial distribution indicated highly clumped distribution of *P. robustus* within trees. In effect, distribution of mistletoes on hosts did not differ from negative binomial distribution for *V. thyrsoidea* ($\mu = 0.57$, $k = 0.150$, $\chi^2 = 9.1$, $df = 9$, $P = 0.422$), *Q. cordata* ($\mu = 3.74$, $k = 0.312$, $\chi^2 = 5.9$, $df = 10$, $P = 0.816$), and *T. laniflora* ($\mu = 0.61$, $k = 0.138$, $\chi^2 = 9.3$, $df = 5$, $P = 0.093$). Data for *M. ferruginata* also indicated clumped distribution ($\mu = 0.11$, $k = 0.081$), but was insufficient for fitting negative binomial distribution.

3.3. *Prevalence and intensity of infection*

From 1,108 potential host trees examined 243 were parasitized (22%). Prevalence ranged from 2% to 41% among plots and was not related to tree density or mean tree height on plots ($F_{2,4} = 0.47$, $R^2 = 0.19$, $P = 0.65$). Prevalence varied among the host tree species (Table 1) and infection frequency differed significantly from expected based on their relative abundances ($G = 45.0$, $df = 3$, $P < 0.001$). *Qualea cordata* occurred in lower densities (12.4 ± 14.5 plants ha^{-1}), comprising only 7.7% of trees sampled, but nearly 20% of all trees parasitized. Conversely, *M. ferruginata* (23.1 ± 30.2 plants ha^{-1}) represented nearly 16% of trees sampled, but only 4.5% of infected hosts. *Vochysia thyrsoidea* (mean ± SD, 95.8 ± 26.8 plants ha^{-1}) was the most common host at the study site, representing nearly 61% of trees sampled and 59% of infected hosts, and *T. laniflora* (26.8 ± 12.1 plants ha^{-1}) represented nearly 17% of hosts and 16% of infected trees. After excluding plant in TH classes not infected by *P. robustus*, the pattern remained the same ($G = 28.7$, $df = 3$, $P < 0.001$, Fig. 3b).

Tree height varied significantly among host species, with *Q. cordata* and *M. ferruginata* being significantly taller than *V. thyrsoidea* and *T. laniflora* ($H_{3,1108} = 45.4$, $P < 0.001$, Table 1). Logistic regression models indicated that probabilities of infection by *P. robustus* raised significantly with increasing TH in all host species (Fig. 3c), *V. thyrsoidea* ($\chi^2 = 75.8$, $P < 0.0001$, $Y = \exp(-3.17 + (0.84)^*X)/(1 + \exp(-3.17 + (0.84)^*X))$), *Q. cordata* ($\chi^2 = 15.5$, $P < 0.001$, $Y = \exp(-2.48 + (1.16)^*X)/(1 + \exp(-2.48 + (1.16)^*X))$), *T. laniflora* ($\chi^2 = 45.8$, $P < 0.0001$, $Y = \exp(-6.28 + (2.46)^*X)/(1 + \exp(-6.28 + (2.46)^*X))$), for *M. ferruginata* ($\chi^2 = 16.7$, $P < 0.001$, $Y = \exp(-8.46 + (2.21)^*X)/(1 + \exp(-8.46 + (2.21)^*X))$).

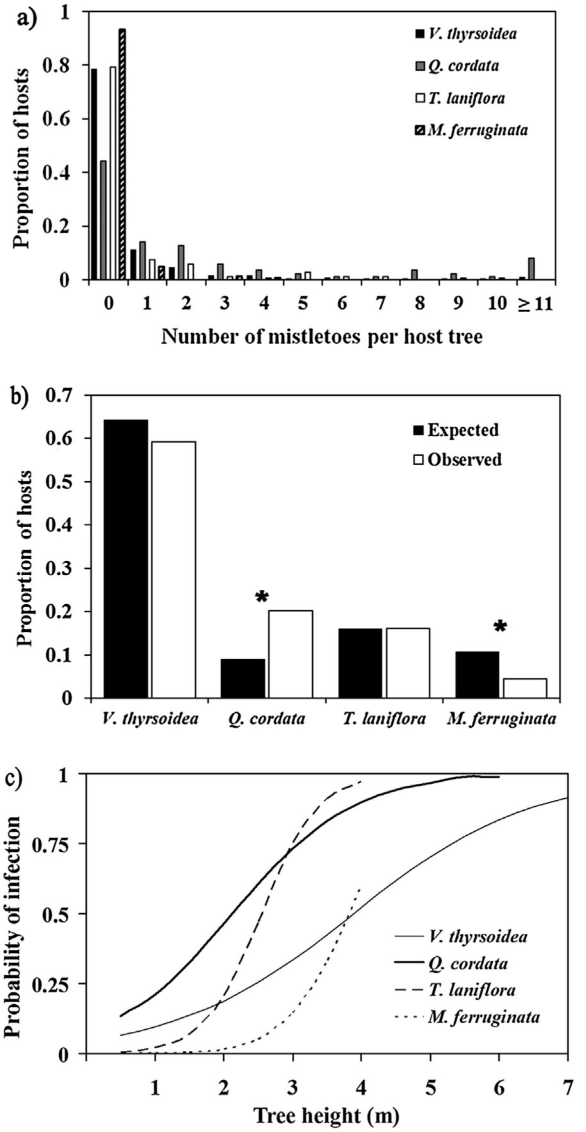

Fig. 3. (a) Aggregated distribution of *Psittacanthus robustus* infections per host tree in *campo rupestre* site, South-eastern Brazil. (b) Among species variation in observed infection frequencies, as the species proportion from 243 infected host trees sampled and expected infection frequencies, according to species proportional abundance from 947 trees sampled including infected and uninfected plants. Species proportional abundance were calculated after excluding 161 trees with TH inferior to the shortest tree infected for each host species. Asterisks denote significant statistical deviation from expected values ($P < 0.01$). (c) Positive relationship between host tree height and probability of infection by *P. robustus* on four host species.

Intensity of infection was higher for *Q. cordata* than for *V. thyrsoidea* and *M. ferruginata*, with *T. laniflora* not differing from the other species ($H_{3,243} = 20.7$, $P = 0.0001$, Table 1). Despite the clear effects of TH on infection prevalence, infection intensity was positively correlated to TH only for *V. thyrsoidea* ($r_s = 0.27$, $P < 0.001$, $n = 144$), but not for *Q. cordata* ($r_s = 0.26$, $P = 0.067$, $n = 49$), *T. laniflora* ($r_s = 0.30$, $P = 0.059$, $n = 39$) and *M. ferruginata* ($r_s = -0.33$, $P = 0.31$, $n = 11$).

4. Discussion

Here, we showed novel host species for *P. robustus*, which infects disproportionally taller trees within Vochysiacea family. This

Table 1
Parameters of host infection by the mistletoe Psittacanthus robustus (Loranthaceae) in campo rupestre vegetation, Serra do Cipó, South-eastern Brazil. Intensity of infection represents the number of mistletoes per tree, considering variance only for those parasitized trees. Prevalence is the fraction of infected trees from all trees sampled for a given host species.

	Host species			
	V. thyrsoidea	*Q. cordata*	*T. laniflora*	*M. ferruginata*
Number of trees	671	87	188	162
Prevalence	0.21	0.57	0.20	0.07
Intensity of infection				
Range	1–30	1–58	1–10	1–4
Median	1^{a}	3^{b}	2^{a}	1^{a}
Mean	2.7	6.6	3.2	1.6
± SD	3.9	9.8	2.7	1.1
n	144	49	39	11
Tree height (m)				
Range	0.53–7.0	0.70–5.9	0.50–3.7	0.55–3.8
Median	1.8^{a}	2.3^{b}	1.7^{c}	2.2^{b}
Mean	2.0	2.4	1.8	2.2
± SD	1.5	1.4	1.4	1.4
n	671	87	188	162

mistletoe presented an aggregated distribution within hosts and at some *campo rupestre* vegetation patches. The highly aggregated distribution within host trees and habitat patches corroborates patterns reported for other mistletoes elsewhere (Aukema, 2004; Fadini et al., 2009; Hist et al., 2011), also reported for *P. robustus* in other sites in Brazil (Monteiro et al., 1992; Teodoro et al., 2010). The main biological mechanism explaining these patterns of distribution is related to the behavior of seed dispersal agents. First, foraging bird dispersers can perch more often on hosts with fruiting mistletoes, generating clumped seed deposition on already parasitized plants (Aukema and Martinez del Rio, 2002b; Medel et al., 2004). Second, foraging dispersers can track abundance of fruiting plants on habitat patches, leading to an increased infection in areas with higher mistletoe prevalence (Martínez del Rio et al., 1996; Garcia et al., 2009). We agree with Teodoro et al. (2010), who suggested that foraging decisions made by avian dispersers are likely to create a positive feedback process leading to a clumped pattern of seed distribution and, consequently, promoting spatial aggregation of *P. robustus* at host and vegetation scales. Nevertheless, the role of avian seed dispersers shaping patterns of distribution of *P. robustus* need proper investigations in the future.

We found *P. robustus* parasitizing *Q. cordata* more frequently than expected by its abundance, suggesting that host tree infection is not random. Differences in mistletoe prevalence among hosts can be related to several processes. Certain hosts can be more compatible than others, resulting in differences in establishment rates among host species (López de Buen and Ornelas, 2002; Fadini, 2011). Bird dispersers could perch preferentially on some tree species, leading to increased seed deposition on larger host trees (Aukema and Martinez del Rio, 2002b; Roxburgh and Nicolson, 2005; Fadini et al., 2009). Monteiro et al. (1992) also suggested that the preference of *P. robustus* for *Qualea grandiflora* was related to the behavior of the swallow tanager (*Tersina viridis*), which usually perch and deposit seeds on the canopy of taller trees. Thus, higher prevalence on *Q. cordata* could be related to population structure of this species that was the tallest species among host trees, although other process require proper evaluation.

Considering tree height as a proxy of plant age, our data indicates that probability of infection rise fast for older hosts. Indeed, positive age prevalence is a common pattern of infection among mistletoes (Overton, 1994; Aukema and Martinez del Rio, 2002a; Roxburgh and Nicolson, 2007), including *P. robustus* (Teodoro et al., 2010). This pattern could be related to longer periods of exposition to mistletoe vectors by older plants (Overton, 1994), but also to variation in establishment success of mistletoes growing on hosts at different life stages (Roxburgh and Nicolson, 2007). This positive relationship between size and prevalence could also be explained by the behavior of seed dispersers together with host characteristics. Some bird dispersers preferentially perch on taller hosts with larger canopies, resulting in higher chances of seed deposition in those older individuals (Aukema and Martinez del Rio, 2002a; Roxburgh and Nicolson, 2007; Fadini et al., 2009). Moreover, this pattern could also be related to low fire tolerance in some mistletoe species (Fadini and Lima, 2012). In effect, fire can increase mortality rates of *P. robustus*, and those plants infecting taller host trees could be less susceptible to negative effect of superficial fires as pointed out by Teodoro et al. (2013).

We updated the host pool of *P. robustus* adding species in distinct families totaling 17 host species in five families, indicating this species as less specialized than previously thought (Monteiro et al., 1992; Teodoro et al., 2010). Although sporadic, we also found *P. robustus* parasitizing species from three angiosperm families without reports, remarkable the infection on *C. serifera*, an endemic and threatened species found exclusively at Serra do Cipó (Ribeiro and Fernandes, 2000). The degree of host specificity is highly variable among *Psittacanthus* species studied so far. For instance, *P. cordatus* seem to be the most generalist species known, infecting 32 host species from at least 17 families in a single site in Brazilian Pantanal (Genini et al., 2012). *Psittacanthus schiedeanus* also present low degree of specialization, infecting 19 host species in 11 families at cloud forests in Mexico (López de Buen and Ornelas, 1999). Conversely, *P. biternatus* and *P. eucalyptifolius* infect seven and two host species, respectively, at an Amazonian Savanna site in northern Brazil (Fadini and Lima, 2012). However, up to now most studies failed to evaluate the effect of sampling effort on the host species richness found on single localities. Our study highlights the need of using rarefaction procedure to determine more accurately the host range of mistletoes and other parasitic plants.

Current information indicates that identity and the number of host species also vary significantly across *P. robustus* geographic range, with higher specialization occurring in some populations. This mistletoe can infect a single host tree in some sites (Teodoro et al., 2010), whereas in other localities it can infect up to eight host species in two families (Monteiro et al., 1992), or even ten species in five families as we recorded in CR. This data corroborate the idea that host range of *Psittacanthus* species might vary among localities. For instance, Caíres et al. (2009) reported *P. plagiophyllus* parasitizing 15 species in ten families in Pantanal woodlands in central Brazil, whereas Fadini and Lima (2012) found the same mistletoe species exclusively on cashew trees in an Amazonian Savanna.

Nearly 85% of *P. robustus* individuals sampled were found on Vochysiaceae species that represented nearly 78% of infected hosts, thus confirming high frequency of species within this family as hosts of *P. robustus* (Monteiro et al., 1992; Teodoro et al., 2010). In effect, *V. thyrsoidea* seem to be a dominant tree species in rocky outcrop patches. According to Norton and Carpenter (1998), the evolution of specialization between mistletoes and their hosts can be favored when compatible host species are highly abundant and predictably distributed. In concordance with this hypothesis, Vochysiaceae species, an exclusive Neotropical family, usually occur in high densities in Brazilian Cerrado physiognomies where *P. robustus* is commonly found. For instance, Silva et al. (2008) sampled over 135,000 trees in the largest assessment of Cerrado *strictu sensu* physiognomy and found 668 species in 78 families, with Vochysiaceae, especially *Qualea* species, being by far the most abundant family with nearly 20% of the trees sampled.

We found *P. robustus* parasitizing species in families Vochysiaceae and Melastomateceae, but also Myrtaceae and Lythraceae, which are all included in the Order Myrtales (APG, 2009). Thus, host specificity in *P. robustus* could be related to anatomical adaptations that allow haustorial attachment to bicollateral vascular bundles and vestured pits in the vessel elements, wood features shared by species within this clade (Conti et al., 1996). In addition, is important to note that aluminum accumulation is especially common in the Myrtales, especially in Melastomataceae (Jansen et al., 2002), a clade highly diversified and dominant at the *CR* (Silveira et al., 2016). This fact suggests that aluminum accumulation by the hosts could be also involved in the evolution of host tree specialization by *P. robustus*. This mistletoe requires high concentrations of this element, which would be available through tapping the xylem of the Al-accumulating host species within Myrtales (Scalon et al., 2013).

In short, *P. robustus* was mostly associated to species within Myrtales clade, especially trees in Vochysiaceae family. When compared to other species in the genus, this mistletoe presented an intermediate degree of host specificity that varies among populations of this widely distributed species. Within the population studied, we found that *Q. cordata* was the tallest and preferred host tree. *Psittacanthus robustus* population presented an aggregated distribution within few taller host trees in some *CR* patches. By unveiling patterns of host infection and mistletoe distribution, we paved the way for future studies addressing the processes involving plant-plant, bird-plant and fire-plant interactions that might shape infection dynamics of this widespread mistletoe species in *campo rupestre* ecosystems.

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