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FORAGING OF THE GOLDEN-CAPPED PARAKEET (*ARATINGA AURICAPILLUS*) IN AN ANTHROPOGENIC LANDSCAPE IN BRAZIL

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Resumo. – **Forrageio do periquito-de-testa-vermelha (*Aratinga auricapillus*) em uma paisagem antropogênica no Brasil.** – Muitos psitacídeos são cada vez mais forçados a viver em paisagens antrópicas, onde seus hábitos de forrageamento e papel ecológico são pouco conhecidos. Nós determinamos a dieta do quase ameaçado e pouco conhecido periquito-de-testa-vermelha (*Aratinga auricapillus*) e examinamos sua ecologia alimentar em uma área modificada pelo homem no Brasil. Ao longo de três anos de observações sistemáticas, nós obtivemos 65 observações de alimentação por 270 periquitos, que forragearam em 28 espécies vegetais, 16 delas exóticas. Sementes imaturas e maduras compuseram 72,3% das observações, sugerindo um importante papel ecológico para este periquito como um predador pré-dispersão de sementes em paisagens antropogênicas. Com base na amplitude de nicho alimentar, no número de espécies de plantas e na composição de plantas, houve clara mudança sazonal no forrageio do periquito, mas disponibilidade de alimento (flores e frutos) não variou entre as estações seca e chuvosa. Nosso estudo demonstra a importância de plantas exóticas cultivadas à persistência local do periquito-de-testa-vermelha. No entanto, recomendamos o manejo com plantas alimentícias nativas alvo, o que poderia minimizar a exploração de plantas exóticas por este psitacídeo.

Abstract. – Many parrots are increasingly forced to live in anthropogenic landscapes, where their foraging habits and ecological role are little known. We determined the diet of the near-threatened and little-known Golden-capped Parakeet (*Aratinga auricapillus*) and examined their foraging ecology in a human-modified area in Brazil. Over three years of systematic observation, we obtained 65 foraging observations by 270 parakeets, which foraged on 28 plant species, 16 of them exotics. Unripe and ripe seeds comprised 72.3% of observations, suggesting an important ecological role for this parakeet as a pre-dispersal seed predator in anthropogenic landscapes. Based on foraging niche breadth, plant species number and plant composition, there were clear seasonal shifts in parakeet foraging, but food item (flowers and fruits) availability did not vary between dry and wet seasons. Our study demonstrates the importance of cultivated exotic plants to local persistence of the Golden-capped Parakeet. However, we recommend management with targeted native food plants, which could minimize the exploitation of exotic plants by this parrot. *Accepted 15 May 2013.*

Key words: Golden-capped Parakeet, *Aratinga auricapillus aurifrons*, generalist seed-eater, habitat restoration, plant phenology, Psittacidae.

INTRODUCTION

Parrots (family Psittacidae) are an ecologically important bird group through their role as pre-dispersal seed predators (Francisco *et al.* 2002, Villaseñor-Sánchez *et al.* 2010, Gilardi & Toft 2012). Several species in this group are seriously threatened by habitat loss resulting

from anthropogenic landscape modification, as well as capture for pet trade (Collar 1996, Snyder *et al.* 2000). Although generally inhabiting forests, some parrots live in anthropogenic landscapes, where their habits and ecological roles are mostly unknown. Some psittacine species can adjust and tolerate habitat modification by eating flowers and fruits of cultivated plants (Pitter & Christiansen 1995, Nunes & Galetti 2007). In this sense, identifying food plants is fundamental for understanding the feeding requirements of these birds in anthropogenic landscapes. Moreover, such information is requisite to plan habitat management, e.g., with targeted plant species, to promote the persistence of psittacines in human altered areas. Information on foraging ecology is also relevant to understand parrots' niches and roles that these birds have in the vegetation dynamics of anthropogenic landscapes (Matuzak *et al.* 2008).

Very little is known about the biology of the Golden-capped Parakeet (*Aratinga auricapillus*). This small psittacid (length 30 cm and 150 g; Forshaw 2006) inhabits mostly semideciduous Atlantic forest in Brazil (Snyder *et al.* 2000). This ecosystem is extensively altered by human activity (Myers *et al.* 2000), promoting consideration of the parakeet as vulnerable (Snyder *et al.* 2000) or near threatened (BirdLife International 2012). Although the Golden-capped Parakeet depends on primary forest (Silva 1995, Collar 1996), some ornithologists have registered the use of human-altered landscapes by this psittacid (Forshaw 1989, Sick 1997, Juniper & Parr 1998, Silveira *et al.* 2005, Forshaw 2006). However, little is known of the habitat elements required for persistence of the parakeet in these areas.

The Golden-capped Parakeet was previously allocated as a subspecies within the Sun Parakeet or *Aratinga soltistiallis* complex (see review in Silveira *et al.* 2005). Currently, it is classified as an autonomous species, and represented by two subspecies: *A. a. auricapillus* and *A. a. aurifrons.* The species' distribution limits remain uncertain, with disjunct resident populations occurring in the states of Bahia, Minas Gerais, Espírito Santo, Rio de Janeiro, São Paulo, Goiás and Paraná (BirdLife International 2012). The *A. a. auricapillus* race occurs mainly in northeastern Brazil, while the *A. a. aurifrons* race occurs in Southeastern and Central Brazil (Forshaw 2006).

A previous foraging study of the Golden-capped Parakeet reported 14 plant species by a reintroduced population in Bahia (Lima & Santos 2005). Other foraging observations, mainly on cultivated plants, were anecdotally reported (Juniper & Parr 1998, Vasconcelos *et al.* 2006, BirdLife International 2012). Here, we present systematic foraging observation of a wild population of the Golden-capped Parakeet. Our data represent a systematic inventory of plant species exploited by the subspecies *A. a. aurifrons* in an extensive human-modified landscape in southeastern Brazil. We also examined the foraging ecology, e.g., dietary shifts between seasons (wet and dry), and discuss the species' ecological role as seed predators. Finally, we identify target native food plants for habitat restoration to facilitate the recovery of this threatened parakeet.

METHODS

Study site. Our study took place in Ilha Solteira, northwestern state of São Paulo (20°25'S, 51°20'W; 380 m a.s.l.), at the confluence of São José dos Dourados and Tiete with the Paraná River, bordering the state of Mato Grosso do Sul. The area is located within the Atlantic Forest biome. However, the presence of some plant species cited as most frequent in the Cerrado biome (Bridgewater *et al.* 2004), suggests that the study area represents a transition zone of these two

biomes. Among these typical Cerrado plants are *Caryocar brasiliense* (Caryocaraceae), *Anadenanthera peregrina*, *Platypodium elegans* (both Fabaceae), *Tapirira guianensis* (Anacardiaceae), *Pseudobombax longiflorum* (Malvaceae), *Cybistax antisyphilitica* (Bignoniaceae), *Myrsine umbellata* (Myrsinaceae), *Terminalia argentea* (Combretaceae) and *Agonandra brasiliensis* (Opiliaceae). In fact, a typical Cerrado (*stricto sensu*) physiognomy is found within 10 km of the study site, in the state of Mato Grosso do Sul.

Currently, natural vegetation, mainly semideciduous and deciduous forest, covers no more than 2% of 63,900 ha of the study area, consisting in small, largely isolated fragments (Kronka *et al.* 2005). Aside from urban development, the main human impacts on this landscape come from a hydroelectric power dam, sugar-cane cultivation, pastureland and small-holding agriculture expansion. The region's climate is markedly seasonal, and the dry season occurs from April to September, with a wet season from October to March, and a mean temperature of 25.6°C (Fig. 1).

Foraging observations. We determined the Golden-capped Parakeet diet and foraging ecology from January–December 2004 and from March 2010–February 2012. Observations of parakeets were conducted using a transect method (Pizo *et al.* 1995, Matuzak *et al.* 2008) along 5 km dirt-track and pavement roads that crossed multiple habitats, such as cultivated and pasture lands, pristine and secondary forest, riparian forest, reforested areas, river-edges, orchards and gardens in rural and urban areas.

We walked each transect (n = 9) systematically twice a month, in the morning (07:30–10:30 h) and afternoon (15:30–18:30 h). Usually two transect were walked by day. We detected parakeets foraging on plants located within 20 m perpendicular to the transect line, and noted date, number of birds, food item (e.g., floral resource, fruits and seeds), stage of ripeness of fruits/seeds and fruit type (dry or fleshy). We defined seed predation when parakeets discarded the exocarp (e.g., capsules and pods in dry fruits) and/or mesocarp (unripe and ripe pulp) of fruits in order to ingest the seeds (Jordano 1992).

Plant species consumed by parakeets were identified using field guides (Lorenzi *et al.* 2002, Lorenzi 2008, 2009, Souza & Lorenzi 2008). Cultivated plants include exotic and native species artificially cultivated for fruit exploitation or ornamental value.

Plants reproductive phenology. As phenological pattern of plant community can explain seasonal dietary shifts in psittacids (Wermundesen 1997, Renton 2001), we evaluated the flowering and fruiting phenology of plants within a 20 m band either side of the nine transect lines (Bencke & Morelatto 2002). We recorded only the presence/absence of phenophases (Frankie *et al.* 1974, Morellato *et al.* 1989, Bencke & Morelatto 2002), to determine the absolute phenological period. Thus, if we could find in a given month at least one individual of a plant species with flowers or fruits, we considered this species in its flowering or fruiting period (Batalha & Mantovani 2000).

Analyses. We used a conservative method taking into account only the first observation of parakeets exploiting a plant species (Ragusa-Netto 2006, Gilardi & Toft 2012). Thus, each foraging observation on a plant is unique and independent. We used the number of birds feeding to estimate foraging niche breadth using Levins' standardized measurement (B_A), where a value close to 0 indicates specialization on a few resources, and a value close to 1 indicates a broad diet with an equal spread of use over the resources (Colwell & Futuyma 1971). We used this niche breadth index, and the number of plants foraged, to identify pos-

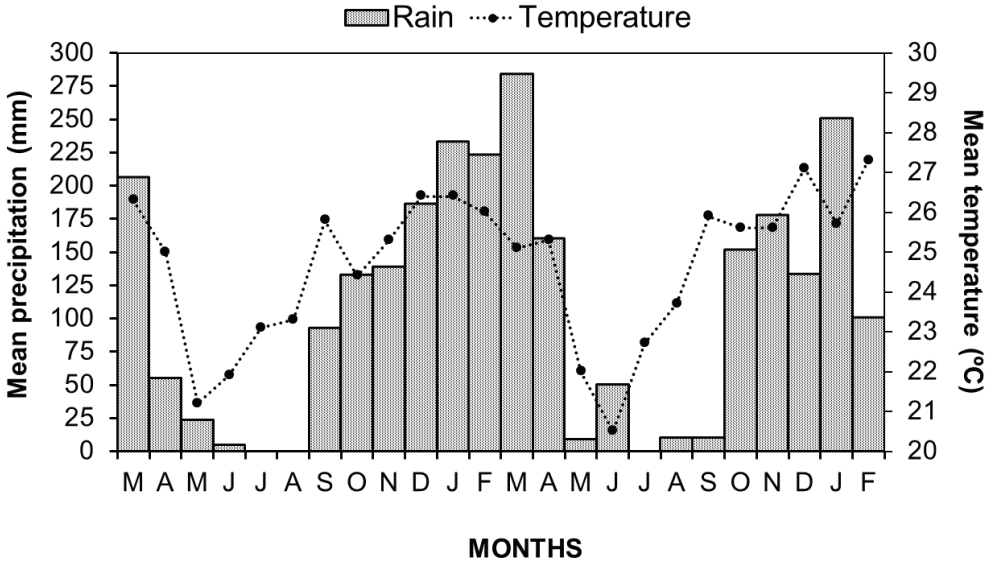

FIG. 1. Monthly temperature and precipitation in Ilha Solteira from March 2010–February 2012 (obtained from http://www.agr.feis.unesp.br/clima.php).

sible seasonal shifts in foraging activities of parakeets (Renton 2001, Matuzak *et al.* 2008). We also used the Morisita-Horn index (C_H) for exploring similarity (values close to 1) and dissimilarity (values close to 0) in the composition of plants foraged by parakeets between seasons.

We used chi-square contingency test to evaluate whether fruit type, as well as the plant origin consumed by parakeets, are associated with season of the year. We used a Kolmogorov-Smirnov (Lilliefors) test to verify data normality. We sampled the phenology repeatedly in the same plants over the months in each season. Thus, a paired *t*-test was used to examine inter-season change in the proportion of plant species offering flowers and fruits. The statistical procedures were carried out in SYSTAT 10.2 (Wilkinson 1998), with $\alpha = 0.05$.

We required a minimum 5% of parakeet foraging observations, and/or parakeets feeding on a specific plant species, for this to be categorized as a target plant species.

RESULTS

Foraging composition and diversity. We obtained 65 foraging observations of 270 Golden-capped Parakeets. The parakeets foraged on 28 plant species (20 cultivated; among them 16 exotics) from 14 families (Table 1), with an overall dietary niche breadth of Levins' $B_A = 0.55$. Four plant families comprised 67.7% of foraging observations (n = 44): Malvaceae (23.1%), Fabaceae (21.6%), Poaceae (12.3%) and Myrtaceae (10.7%). Overall, most parakeets (143 individuals) were observed foraging on exotic cultivated plant species (49% of foraging observations; n = 32), while an additional 44 parakeets were observed foraging on native cultivated plant species, with observations of a total of 83 individuals foraging on native non-cultivated plant species.

Parakeets ingested mainly unripe and ripe seeds (72.31%, n = 47), followed by floral resources such as nectar, petals and buds (16.9%, n = 11), unripe and ripe pulp (7.7%, n = 5), and lichens (3.1%, n = 2). Fleshy fruits

TABLE 1. Plants foraged by the Golden-capped Parakeet during dry and wet seasons at the study site. Native cultivated species are marked with *, and exotic cultivated are marked with **. Symbol † indicates cultivated fruits and ‡ cultivated ornamentals. Plants food item are coded as: rs = ripe seed, us = unripe seed, rp = ripe pulp, up = unripe pulp, f = flower, n = nectar, d = dub, l = lichen.

Family and species	Food item	Foraging observations (%)			Percentage of parakeets
		Dry season	Wet season	Total	
Anacardiaceae					
Spondias dulcis **†	rp	4.44	-	3.08	1.85 (5)
Astronium fraxinifolium	rs	2.22	-	1.54	0.74 (2)
Arecaceae					
Archontophoenix cunninghamii **‡	up	2.22	-	1.54	1.11 (3)
Bignoniaceae					
Handroanthus impetiginosus *‡	n, rs	2.22	10.00	4.62	4.07 (11)
Combretaceae					
Terminalia catappa **‡	up, l	4.44	-	3.08	1.48 (4)
Euphorbiaceae					
Croton urucurana	us	-	5.00	1.54	3.33 (9)
Fabaceae					
Albizia niopoides	us	2.22	-	1.54	2.59 (7)
Anadenanthera peregrina	us	2.22	-	1.54	2.59 (7)
Apuleia leiocarpa	us	2.22	-	1.54	0.37 (1)
Bauhinia variegata **‡	n	-	5.00	1.54	0.74 (2)
Poincianella pluviosa *‡	us	-	10.00	3.08	5.19 (14)
Hymenaea courbaril	d	-	10.00	3.08	1.11 (3)
Pterogyne nitens	us	8.89	-	6.15	13.33 (36)
Schizolobium parahyba *‡	f	-	10.00	3.08	3.33 (9)
Malvaceae					
*Abelmoschus esculentus***†	us	-	5.00	1.54	0.74 (2)
Ceiba speciosa *‡	n	11.11	-	7.69	3.70 (10)
Guazuma ulmifolia	us	20.00	-	13.85	6.67 (18)
Meliaceae					
Melia azedarach **‡	us	2.22	5.00	3.08	6.30 (17)
Moraceae					
Ficus benjamina **‡	rs	4.44	-	3.08	3.33 (9)
Ficus religiosa **‡	l	2.22	-	1.54	0.37 (1)
Morus nigra **†	rp	-	5.00	1.54	3.33 (9)
Myrtaceae					
Corymbia citriodora **‡	us	-	10.00	3.08	4.07 (11)
Psidium guajava **†	rs	-	25.00	7.69	7.04 (19)
Oleaceae					
Ligustrum lucidum **‡	us	4.44	-	3.08	1.48 (4)
Oxalidaceae					
Averrhoa carambola **†	us	4.44	-	3.08	2.96 (8)
Poaceae					
Sorghum bicolor **†	us	4.44	-	3.08	3.33 (9)
Zea mays **†	us	13.33	-	9.23	12.22 (33)
Rutaceae					
Citrus reticulate **†	rp	2.22	-	1.54	2.59 (7)

and dry fruits were exploited in similar proportions of 43.1% (n = 28 foraging observations on 14 plant species) and 38.5% (n = 25 foraging observations on 10 plant species), respectively.

Seed predation. Excluding January, when there were no foraging observations, and December, when nectar was most consumed, unripe and ripe seeds were major food item exploited by parakeets each month (Fig. 2), being ingested in a total of 19 plant species consumed by 213 Golden-capped Parakeets (Table 1). Feeding behavior on seeds was invariable. When exploring fruits parakeets open the exocarps with their bills removing the seeds and mandibulate it before swallowing them, thus acting as a seed predators.

Seasonal shifts in foraging. Golden-capped Parakeets foraged on 11 plant species in the wet season (n = 20 foraging observations by 93 birds; Levins' B_A = 0.77). In the dry season, they foraged on 19 plant species (n = 45 foraging observations by 177 birds; Levins' B_A = 0.46), an increase of 42% in the plant species exploited. Only two plant species, the native *Handroanthus inpetiginosus* and the exotic *Melia azedarach*, were foraged on in both seasons (Table 1). Thus, between the wet and dry seasons food plant species foraged by parakeets were highly dissimilar (Morisita Horn; C_H = 0.05). However, the use of dry and fleshy fruits by parakeets (n = 241 birds) was similar between the dry and wet seasons (χ^2 = 0.01, df = 1, P = 0.91, Fig. 3a). The use of exotic and native species also was similar between the dry and wet seasons (χ^2 = 0.40, df = 1, P = 0.55, Fig. 3b).

Plants reproductive phenology. We recorded reproductive phenology in 168 plant species systematically for 48 two-week periods. The proportion of species flowering did not vary between seasons (paired t-test = -0.80, df = 23, P = 0.43, Fig. 3c). However, plant species bearing dry fruits were more common in the dry than the wet season (paired t-test = 7.29, df = 23, P < 0.001, Fig. 3c). In contrast, plant species presenting fleshy fruits were more common in the wet than the dry season (paired t-test = -4.55, df = 23, P < 0.001, Fig. 3c). Thus, considering both fruit types, the proportion of plant species bearing fruits was similar between seasons (paired t-test = 0.47, df = 23, P = 0.64, Fig. 3c).

Major food plants. The plant species observed most frequently as being foraged on by parakeets, and thus potential target species, were seeds of the native non-cultivated *Guazuma ulmifolia* (13.9%, n = 9 observations), and the exotic cultivated *Zea mays* (9.2%, n = 6 observations), followed by nectar of the native cultivated *Ceiba speciosa* and seeds of the exotic cultivated *Psidium guajava* (7.7%, n = 5 observations each), as well as seeds of the native non-cultivated *Pterogynes nitens* (6.2%, n = 4 observations). Of these plants, *P. guajava* was foraged on only in the wet season (Table 1).

The food items consumed by the greatest number of parakeets were seeds of the native non-cultivated *P. nitens* and the exotic cultivated *Z. mays*, followed by seeds of the exotic cultivated *P. guajava*, the native non-cultivated *G. ulmifolia,* exotic cultivated *M. azedarach*, and native cultivated *Poincianella pluviosa* (Table 1).

DISCUSSION

Foraging composition and diversity. Our study was the first to systematically survey food plants and dietary composition for a wild population of the Golden-capped Parakeet, recording 28 plant species from 14 families, of which 26 species and 12 families represent novel observations. We found an extensive use of exotic plants by the Golden-capped Parakeet, which corresponds with previous anecdotal reports

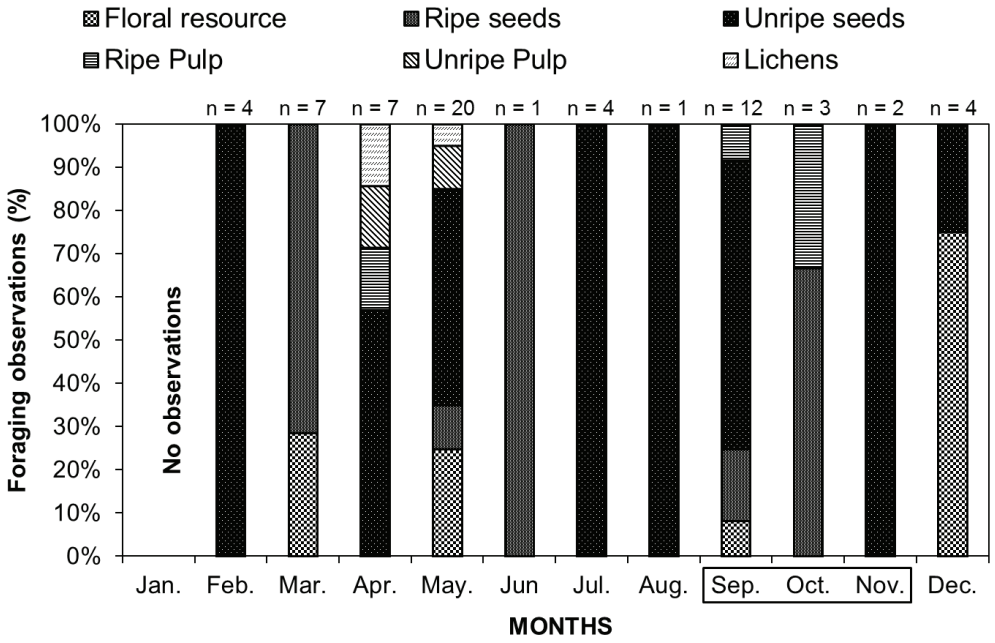

FIG. 2. Monthly food item use based on percentage of foraging observations of the Golden-capped Parakeet at the study site in Ilha Solteira, Brazil. The frame around September to November indicates Golden-capped Parakeet breeding season at study site.

of parakeets foraging on cultivated exotics, such as *Mangifera indica* (Anacardiaceae), *Carica papaya* (Caricaceae), *Citrus* sp. (Rutaceae), and *Z. mays* (Poaceae) (Juniper & Parr 1998, BirdLife International 2012). The use of cultivated exotics by the Golden-capped Parakeet is greater than reported for other species of *Aratinga* in anthropogenic landscape, such as Cactus Parakeet (*A. cactorum*) (Barros & Marcondes-Machado 2000), Pacific Parakeet (*A. strenua*) (Wermundesen 1997), Orange-fronted Parakeet (*A. canicularis*) (Matuzak *et al.* 2008), and Peach-fronted Parakeet (*A. aurea*) (Paranhos *et al.* 2009). This indicates tolerance and adjustment to man-modified landscapes by the Godden-caped Parakeet. Yet, it suggests that this parakeet has a pronounced food dependency of exotic plants.

Our study also revealed higher seed ingestion and a low use of fruit pulp by this parakeet. This is uncommon in smaller sized psittacids (Desenne 1994, Pizo *et al.* 1995, Matuzak *et al.* 2008), mainly in the *Aratinga* genus, where fruit pulp comprises 22–47% of the diet (Barros & Marcondes-Machado 2000, Matuzak *et al.* 2008, Paranhos *et al.* 2009), or is ingested for many food plants (Wermundesen 1997, Palomera-Garcia 2010). Our study also expanded the Golden-capped Parakeets food items to floral resources, which was the second major food type consumed in both wet and dry seasons, and we recorded the use of lichens.

Three plant species previously reported in the diet of the Golden-capped Parakeet, *M. indica*, *C. papaya*, and the native *Myracrodruon urundeuva* (Anacardiaceae) (Vasconcelos *et al.* 2006), are abundant in our study site, but we did not record parakeets foraging on these plant species. Hence, the number of food

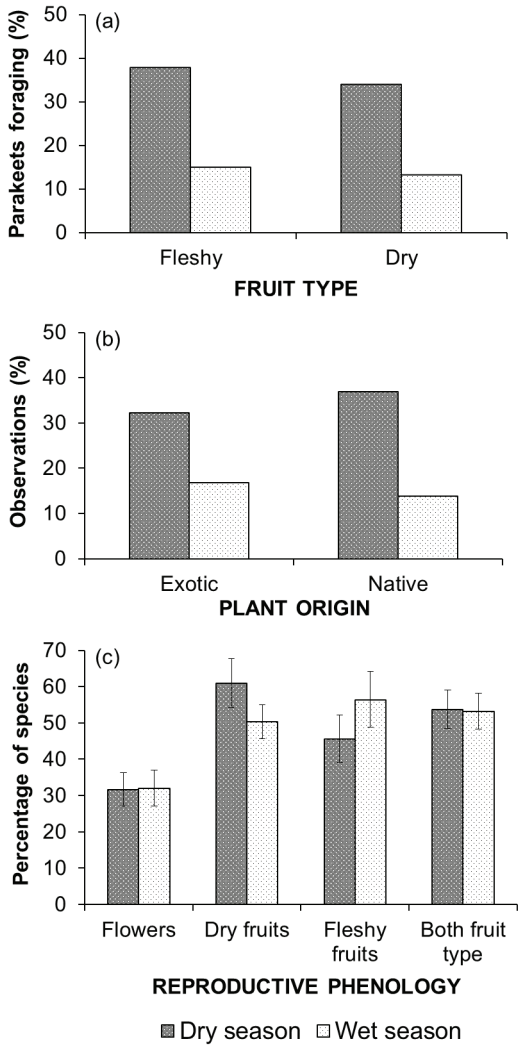

FIG. 3. (a) Inter-seasonal use of fleshy and dry fruits by the Golden-capped Parakeet. (b) Inter-seasonal use of exotic and native plants by the Golden-capped Parakeet. (c) Reproductive phenology (mean ± 1 DP) of plant species (90 with dry fruits and 78 with fleshy fruits) at the study site in Ilha Solteira, Brazil.

plants exploited by parakeets at the study site may still be incomplete.

The number of food plant species registered in our study site, however, was satisfactory to infer a generalist or diversified foraging pattern for the Golden-capped Parakeet, as suggested for other *Aratinga* species (e.g., Roth 1984, Galetti & Pedroni 1996, Paranhos *et al.* 2009). Another indication of this generalist pattern was the broad dietary niche breadth indicated by the Levins' index. Interestingly, this index was equal (B_A = 0.55) to that obtained for the Orange-fronted Parakeet in an anthropogenic landscape in Costa

Rica, where parakeets foraged on 24 plant species, including cultivated exotics (Matuzak *et al.* 2008). These parallels highlight the foraging versatility of *Aratinga* species and reinforce the potential of this genus to colonize and possibly persist in human-modified environments.

Parakeets as pre-dispersal seed predators. The Golden-capped Parakeet is primarily a seed eater or a seed predator. Although they may accidentally ingest intact seeds (e.g., tiny-seeds of *Ficus benjamina* and *Morus nigra*), seed dispersal by this bird is less probable (cf. Janzen 1981, Figueiredo 1996). Seeds are high in protein, minerals and lipid content (Gilardi & Toft 2012), suggesting that the parakeet obtains a great nutritional benefit from the plants they consume, including in the breeding season (cf. Fig. 2). Thus, foraging by parakeets may negatively affect seed dispersal in these plants, potentially reducing seedling recruitment. As with other seed predators, parakeets could potentially contribute to the maintenance of local plant diversity (cf. Renton 2001, Francisco *et al.* 2002, Villaseñor-Sánchez *et al.* 2010): e.g., preventing the establishment and dominance by common plant species (Ragusa-Netto 2006). Seed predation by parakeets also has ecological implications in modified landscapes, such as the natural control of invasive exotic plants as in the case of *M. azedarach* in our study site (Silva 2005). Moreover, the tendency of parakeets to forage on exotic plants could reduce seed predation on native species. This potentially minimizes the negative impacts on the recruitment of native plants, which is an important process in natural regeneration in modified landscapes. However, this phenomenon mediated by parakeets requires a more detailed investigation.

Seasonal shifts in parakeet foraging. We found evidence of seasonal shifts in Golden-capped Parakeet foraging, exhibiting a narrower dietary niche breadth in the dry season and very little inter-seasonal similarity in plants foraged. This corresponds with the seasonal variation in diet reported for Pacific Parakeet (Wermundsen 1997) and Orange-fronted Parakeet (Matuzak *et al.* 2008). Interestingly, Golden-capped Parakeet narrower dietary occurred despite of an increase in the number of food plant species during the dry season.

One hypothesis to explain inter-seasonal variation would be a seasonal change in plant phenological patterns, such as an increase in food abundance and diversity of food items (Wermundesen 1997). For example, the Lilac-crowned Parrot (*Amazona finschi*) demonstrated a narrower dietary niche breadth when resources were least abundant (Renton 2001). However, this does not seem to be the case for the Golden-capped Parakeet, as we found little variation in fruiting and flowering phenology between seasons. Furthermore, although we determined significant seasonal variation in the number of species producing fleshy or dry fruits, the Golden-capped Parakeet used both food types indiscriminately.

An alternative hypothesis to explain a narrower dry season diet for the Golden-capped Parakeet may be due to plant food preferences. For example, preference for *Terminalia catappa* by the Scarlet Macaw (*Ara macao*) was considered as one of the probable factors responsible for their narrow diet (Matuzak *et al.* 2008). In our study site, four of the five major food plants consumed by Golden-capped Parakeets were exploited only in the dry season: *C. speciosa*, *G. ulmifolia*, *P. nitens*, and *Z. mays*, of which only *Z. mays* is an exotic species. In fact, Levins' foraging breadth increased substantially from 0.46 to 0.65 in the dry season when these items were removed from the analysis.

Food plants and parakeet persistence. The food requirements of the Golden-capped Parakeet

in the anthropogenic landscape of our study site incorporated mainly cultivated plants, many of them exotics, used in both dry and wet season. In general, these plants were found in gardens, orchards and crops at small farms. We did not perceive severe conflicts with humans due to fruit damage by parakeet, but exacerbated exploitation of *Z. mays* corn may potentially initiate conflicts (cf. Bucher *et al.* 1990). In fact, exploitation of exotic plants in small farms is important for local maintenance of this psittacid. Nonetheless, a local management plan with native species could minimize foraging dependence on exotic plants, avoiding the development of possible conflicts with man (e.g., Matuzak *et al.* 2008).

Native food plant species considered important in local land management are those with a reproductive cycle occurring throughout the year. We highlight *G. ulmifolia* and *P. nitens* as target species, as they retain fruits for more than ten months, and *C. speciosa*, which flowers throughout five months (PAS unpubl. data). The association of the Golden-capped Parakeet with a large number of fabaceous or leguminous species, whose fruits also are persistent in the branches, suggests that this family may also be an important food resource, as well as to other parrots (Roth 1984, Galetti 1993, Renton 2001, Ragusa-Netto 2006), mainly in rural home-gardens (Goulart *et al.* 2011).

Considering that Golden-capped Parakeets forage in small farms, the restoration of deforested areas with select native plants in rural small-holdings could promote higher landscape quality for the maintenance of this near-threatened parakeet. It may be noted that fruits of *G. ulmifolia* are also exploited by three threatened species (according to Silveira *et al.* 2009) in this region, Yellow-faced Parrot (*Alipiopsitta xanthops*), Blue-fronted Parrot (*Amazona aestiva*), and Chestnut-eared Arassari (*Pteroglossus castanotis*). Hence, restoration with native plants may benefit other threatened fruit-eating birds in the state of São Paulo, which are still common at the study site.

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