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Picky Palmchats (*Dulus dominicus*): do they really prefer to nest in royal palms?

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Photo: André Dhondt

Picky Palmchats (*Dulus dominicus*): do they really prefer to nest in royal palms?

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Abstract Palmchats (*Dulus dominicus*) are widespread, medium-sized passerines endemic to Hispaniola. Palmchats build large, intricate stick nests mostly in palm trees, sometimes in deciduous trees, and rarely on the ground. The purpose of this study was to determine which palm tree species Palmchats nest in, and what factors influence tree choice for nest building. At sites with four different palm species, we found that Palmchats preferred royal palms (*Roystonea borinquena*) and Hispaniolan silver thatch palms (*Coccothrinax argentea*) for nesting over cana (*Sabal domingensis*) and coconut palms (*Cocos nucifera*). Palm trees with nests are taller and have a larger circumference at breast height than neighboring trees without nests, regardless of tree species.

Keywords Dominican Republic, *Dulus dominicus*, Hispaniola, nest site selection, Punta Cana, tree species

Resumen *Dulus dominicus*: ¿realmente prefiere anidar en palmas reales? • *Dulus dominicus* es una especie de paseriforme de tamaño mediano, amplia distribución y endémica de La Española. Sus representantes construyen grandes e intrincados nidos con ramas, principalmente en palmas, a veces en árboles deciduos y rara vez en el suelo. El objetivo de este estudio fue determinar en qué especies de palmas anidan estas aves y qué factores influyen en la selección del árbol para la construcción de nidos. En sitios con cuatro especies de palmas diferentes, encontramos que *D. dominicus* prefirió *Roystonea borinquena* y *Coccothrinax argentea* para nidificar, más que *Sabal domingensis* y *Cocos nucifera*. Las palmas con nidos son más altas y tienen una circunferencia mayor a la altura del pecho que los árboles vecinos sin nidos, independientemente de la especie de árbol.

Palabras clave *Dulus dominicus*, especies arbóreas, La Española, Punta Cana, República Dominicana, selección del sitio de nidificación

Résumé L'Esclave palmiste (*Dulus dominicus*) préfère-t-il vraiment nicher dans les palmiers royaux? • L'Esclave palmiste (*Dulus dominicus*) est un passereau de taille moyenne, très répandu et endémique d'Hispaniola. Il construit de grands nids complexes formés d'amas de brindilles, le plus souvent dans les palmiers, parfois dans les arbres à feuilles caduques, et rarement sur le sol. L'objet de cette étude était de déterminer les espèces de palmiers dans lesquelles nichent les Esclaves palmistes, et les facteurs qui influent sur le choix des arbres pour la construction des nids. Sur des sites comportant quatre espèces de palmiers différentes, nous avons constaté que les Esclaves palmistes préféraient nicher dans *Roystonea borinquena* et *Coccothrinax argentea* plutôt que dans *Sabal domingensis* ou *Cocos nucifera*. Les palmiers avec nids étaient plus grands et avaient une circonférence plus importante à hauteur de poitrine que les arbres voisins sans nids, quelle que soit l'espèce d'arbre.

Mots clés *Dulus dominicus*, espèces d'arbres, Hispaniola, Punta Cana, République dominicaine, sélection du site de nidification

Palmchats (*Dulus dominicus*) are medium-sized passerines endemic to the island of Hispaniola and its satellite islands. Despite being numerous and widely distributed in lowland habitats, Palmchats are surprisingly poorly studied (Dzielski 2020). They are the sole member of the family Dulidae. Similar to Monk Parakeets (*Myiopsitta monachus*), Sociable Weavers (*Philetairus socius*), and Red-billed Buffalo-Weavers (*Bubalornis niger*), Palmchats are communal nesters, meaning that their large stick nests

are built and inhabited by multiple pairs of birds, each of which builds and defends its own chamber while the entire nest structure is built, at least in part, together by the occupants (Wetmore and Swales 1931, Keys 1991, Dhondt *et al.* 2019). Typically, one group of Palmchats, consisting of several pairs, occupy a nest in a single palm tree. Rarely a nest in a single tree is occupied by two groups of Palmchats that aggressively interact or one group of birds occupies two nests in adjacent trees (Keys 1991), but nests can be built in adjacent trees by different groups of birds (Keys 1991, Dhondt *et al.* 2019). Groups of Palmchats bring nest material to their nests year-round, as they also use these nests for roosting during the non-breeding season (Dhondt *et al.* 2019). Although Palmchats breed primarily in royal palms

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(*Roystonea borinquena*), they also build their large nests in other tree species (Wetmore and Swales 1931, Bond 1985, Guerrero 1990, 1997, Dod 1992, Kirwan et al. 1996, Keith et al. 2003, Dzielski 2020). In exceptional cases, nests are constructed on poles or even on the ground (Fernández and Keith 2003). So far, no published study has assessed what factors influence Palmchat nest tree selection. Other communal nesters show a clear tree species preference when deciding where to build communal nests. Monk Parakeets prefer to nest in tall eucalyptus trees in Argentina (Navarro et al. 1992) and tall palms in Spain (Sol et al. 1997), while Sociable Weavers prefer to nest in camel thorn (*Acacia xgiraffae*) that contain stout horizontal branches (Maclean 1973).

In this paper, we test the hypothesis that Palmchats prefer royal palms for nesting and explore if there is a preference for taller trees or trees with a larger circumference.

Methods

We studied Palmchat nesting behavior in a lowland coastal dry forest in Punta Cana, Dominican Republic (18°51'N, 68°37'W) during 2 weeks in January 2020. All six study sites were located on the grounds of the Punta Cana Resort & Club property and distributed over ~1,000 ha. In each site, we recorded the presence or absence of Palmchat nests in all trees within a given area, not distinguishing between nests built at the base of the fronds or on top of the racemes.

In two sites, Palmchats used four different palm tree species for nesting: the regional endemic royal palm and Hispaniola palmetto (*Sabal domingensis*; locally called cana palm), the endemic Hispaniolan silver thatch palm (*Coccothrinax argentea*), and the non-endemic coconut palm (*Cocos nucifera*). This made it possible to determine which, if any, palm species Palmchats preferentially use for nesting. The Old Hotel site (103 trees measured; Fig. 1) covered ~2.25 ha around the abandoned hotel and contained all four palm species examined in our study. The site was surrounded by dense natural forest. The Fundación site (31 trees measured; Fig. 1) contained mostly royal palms and covered ~1.5 ha. This site was located around the Fundación Punta Cana Research and Science Center and was surrounded by dense natural vegetation.

In addition to these two sites, we selected four other sites that contained large numbers of a single species of palm tree, some of which had Palmchat nests. This allowed us to compare differences between trees with and without nests. The Gates site (50 trees measured; Fig. 1) was located just past the entrance gates to the Punta Cana Resort & Club. Along the median of ~1,600 m of a busy four-lane road, cana palms had been planted at regular intervals. The road was surrounded on both sides by dense natural forest. In the Hacienda site (Fig. 1), we measured 57 cana palms that had been planted along an 800-m long road within a golf course surrounded by villas and large areas of natural forest.

To examine how the vegetation surrounding palm trees influences their use as nest trees, we studied two sites containing mainly coconut palms but with differing surrounding vegetation. The Marina site (57 trees measured; Fig. 1), consisted of two rows of coconut palm trees, one on either side of a 700-m long road leading to the marina, and was surrounded by dense forest on both sides. The Golf site (50 trees measured; Fig. 1), consisted



Fig. 1. A map of the area around the Punta Cana Resort & Club, Punta Cana, Dominican Republic, showing the location of each of our study sites. Map credit: Alison Ollivierre.

of coconut palms planted along either side of the road leading to the Cana Golf clubhouse. These coconut palms, located in the middle of the golf course, were distant from forested areas and did not contain a single Palmchat nest. The closest natural forest was at least 250 m away.

For each tree included in our analyses, we estimated the diameter at breast height as well as tree height. Because we never observed nests in palm trees with vegetation within 50 cm of their leaf base or in palm trees measuring less than 5 m in height (except in cana palms at the Gates site), we excluded these trees from samples without nests, so as not to bias the comparisons.

To quantify tree girth, we measured trunk circumferences at breast height by wrapping a rope, marked at 10 cm increments, around each tree. This made it possible to estimate circumference to the closest centimeter. Because we lacked sophisticated tools to measure tree height (the distance from the base of the tree to the leaf base) we used the following procedure: a person of 1.8 m height stood next to the tree for scale. Two observers stood ~5 m away and independently estimated tree height, after which they compared results and averaged the two estimates. This average was used as an estimate of tree height.

To determine if the proportion of trees with a nest differed

Table 1. Proportion of palm trees of different species with Palmchat nests at two sites (Fundación and Old Hotel) in Punta Cana, Dominican Republic. Ratios of occupied trees compared to all trees for each species are shown.

Palm species	Fundación	Old Hotel	Sum	Proportion with Nest
Cana	0/1	1/18	1/19	0.05
Coconut	1/4	2/13	3/17	0.18
Thatch	1/2	9/22	10/24	0.42
Royal	11/24	22/50	33/74	0.45

between the different palm tree species, we used a χ^2 test or Fisher's exact test when appropriate. We compared mean measurement values using a t-test (with a Satterthwaite correction for unequal variance if needed), or with an Analysis of Variance if more than two samples were compared. We used Pearson correlation coefficients to determine if tree height and tree circumference were correlated. We performed all statistical analyses using Statistix 10 analytical software (Statistix, Tallahassee, FL, USA).

Results

Nest Selection in Sites with Four Palm Tree Species

To determine if Palmchats prefer a particular palm tree species, we limited this analysis to the two sites (Fundación and Old Hotel) in which all four palm tree species were present (Table 1). We combined the counts from the two sites for our statistical analyses since the proportion of occupied trees did not differ between the two sites for any of the tree species (Fisher's exact test, $p > 0.5$). The proportion of trees with Palmchat nests differed significantly between palm tree species ($\chi^2 = 12.51$, $df = 3$, $p = 0.006$). Palmchat nests were more likely to be observed in royal palms and thatch palms than in cana palms and coconut palms. There was no significant difference between the proportion of royal palms with nests and the proportion of thatch palms with nests ($\chi^2 = 0.06$, $df = 1$, $p = 0.8$).

Nests in Sites with Only One Palm Tree Species

When royal palms or thatch palms are available, only few Palmchat nests are found in other palm tree species (Table 1). By comparing the proportion of trees with a Palmchat nest between sites where only a single palm tree species is present to sites where four palm species are present, we assessed if, in the absence of a preferred palm tree species, Palmchats are more likely to build a nest in one of the less preferred palm tree species. At the Hacienda site, where only royal palms were present, the proportion of occupied royal palms (37%) did not differ significantly from the combined mixed sites (45%; $\chi^2 = 0.86$, $df = 1$, $p = 0.35$). At the Gates site, where only cana palm trees were present, 40% of trees contained a Palmchat nest, significantly more than the 5% recorded at the combined mixed sites (Fisher's exact test, $p = 0.007$). At the Marina site, where only coconut palms were present, 11% of trees contained a Palmchat nest, a non-significant difference compared to the 18% recorded at the combined mixed sites (Fisher's exact test, $p = 0.42$).

The Effect of Surrounding Vegetation on Nest Tree Choice

Utilizing the landscape heterogeneity of Punta Cana, we examined the effect of surrounding vegetation on nest tree selection. To compare the impact of adjacent natural forest on nest site choice while keeping tree species constant, we compared the Marina and the Golf sites, as they both consisted of coconut palms but differed in their surrounding vegetation. At the Marina site, which was surrounded by dense forest, we recorded Palmchat nests in 6 of the 57 coconut trees that we measured. In contrast, at the Golf site, which was more than 250 m from the closest forested areas, we did not observe a single Palmchat nest in the 50 coconut palms we measured (Fisher's exact test, $p = 0.029$). The presence of forested areas, therefore, seems to influence the Palmchat's nest tree choice, although larger sample sizes across additional plots are needed to confirm this.

Tree Size and Nest Site Selection

To determine if tree height or circumference differed between trees with and without nests, we compared the measurements of palm trees of the same species in plots where at least six trees of the same species contained a Palmchat nest. In five of the six comparisons, trees with nests were taller than trees without nests, although the difference was statistically significant in only two comparisons (Table 2). Trees with a nest had a significantly larger circumference in all six comparisons, regardless of the tree species. However, this could be the result of trees with larger circumferences also being taller, since tree height and trunk circumference were significantly correlated in both royal palms ($n = 152$, $r = 0.45$, $p < 0.0001$) and cana palms ($n = 70$, $r = 0.55$, $p < 0.0001$). In thatch palms, circumference seemed to be more important than height as circumference and height were not significantly correlated ($n = 24$, $r = 0.11$, $p = 0.62$); thatch palms with nests had a significantly larger circumference while their heights did not differ significantly. For coconut palms, the relative importance of height and circumference is unclear as these two measures were weakly correlated ($n = 80$, $r = 0.21$, $p = 0.06$); however, both height and circumference were larger in trees with nests (Table 2). To further examine the relative importance of height and circumference in coconut palm nest tree selection, more trees need to be measured.

Discussion

In our study sites at Punta Cana, Palmchats showed a pronounced preference for royal and thatch palms when available. Thatch palms, however, were rare in our study sites. In plots where royal palms were present, cana and coconut palms had fewer nests, suggesting a preference for royal palms over other palm species. Our results agree with previous studies showing that the royal palm is the main tree species for Palmchat nesting (Dod 1992, Keith et al. 2003, Dzielski 2020). Previous studies have also shown that, in the absence of royal palms, Palmchats frequently build nests in other tree species (Dod 1992, Keith et al. 2003), which is confirmed by our data. In the Punta Cana area, we have occasionally observed large Palmchat nests in broad-leaved trees, typically in isolated trees. We were surprised by the high proportion of cana palm trees with nests at the Gates site (40%), as these trees were not very tall (4 m on average; Table 2) and were planted in the median strip of a busy road. Some

Table 2. Comparison of height and circumference of palm trees with and without Palmchat nests, at sites where at least six trees of a single species contained a Palmchat nest. We corrected t-values using Satterthwaite correction for unequal variance (indicated with §) if the variance differed between the two groups.

Palm Species	Site	No Nest			Nest			t-value	df	p-value
		Mean	SE	n	Mean	SE	n			
<i>Tree height (m)</i>										
Royal	Fundación	5.7	0.17	13	5.9	0.51	11	0.52	12.3	0.6100 §
Royal	Old Hotel	6.4	0.20	26	7.7	0.24	24	4.24	48.0	0.0001
Royal	Hacienda	5.8	0.16	49	6.2	0.14	29	1.75	76.0	0.0800
Thatch	Old Hotel	7.2	0.30	13	7.8	0.35	9	1.27	20.0	0.2200
Coconut	Marina	5.6	0.08	51	6.8	0.38	6	3.25	5.4	0.0200 §
Cana	Gates	4.1	0.18	30	4.0	0.12	20	0.56	46.4	0.5800 §
<i>Tree circumference (cm)</i>										
Royal	Fundación	70.0	8.70	13	105.6	17.90	11	4.07	19.5	0.0006
Royal	Old Hotel	60.1	5.92	26	117.1	2.61	22	8.75	34.3	0.0000
Royal	Hacienda	90.0	3.51	49	104.6	2.90	29	3.20	75.5	0.0020 §
Thatch	Old Hotel	60.0	7.21	13	67.8	1.86	9	2.71	20.3	0.0130
Coconut	Marina	72.5	1.14	51	93.7	5.41	6	3.83	5.5	0.0100 §
Cana	Gates	120.8	3.06	30	130.1	3.01	20	2.08	48.0	0.0400

of these nests were very large, close to the ground, and several had parts fallen on the ground (see cover photograph). We speculate that Palmchats selected these trees because there were no other appropriate trees in the surrounding forest, and perhaps because the location in the median of a four-lane road offered protection against predation by snakes (Landestoy *et al.* 2017) and Javan mongoose (*Herpestes javanicus*), as suggested by a reviewer, allowing relatively low nests to be successful.

In addition to tree species, the surrounding vegetation was also an important factor influencing nest tree selection. This was illustrated by our analysis comparing coconut palms surrounded by forest with coconut palms far from forests. We did not record any Palmchat nests in coconut palms without neighboring forest, while we observed several nests in coconut palms surrounded by forest. Thus, our results suggest that Palmchats in Punta Cana prefer locations for nest building that are proximal to forested vegetation. We speculate that Palmchat nests are more often built in the proximity of forested vegetation because they use the forest as a source of twigs and food, continuously build their nest year-round, and return to their nest every day throughout the year (Dhondt *et al.* 2019). Since Palmchats very rarely pick up fallen twigs from the ground, and instead break off twigs from bushes and trees (pers. obs.), it would be adaptive to nest close to forest. Other causes for this observation, however, might exist and this merits further research.

Tree circumference and height also affected nest tree choice in our study. Palmchats preferred trees with a bigger trunk circumference, regardless of the tree species, and in some cases taller trees were also preferred, although this requires further study (Table 2). This could be because wider trees provide more support for the nest or are more resistant to storm winds. During our stay in Punta Cana in January 2020, there were several days with very strong winds, after which Palmchat nests had fallen out of two thatch palms and one royal palm at the Old Hotel site. These trees were all very tall and thin, hinting, perhaps, at

why Palmchats prefer thicker trees.

We can conclude that Palmchats show a high level of nest tree selectivity, similar to that of Monk Parakeets and Sociable Weavers (Maclean 1973, Navarro *et al.* 1992, Sol *et al.* 1997): they prefer to build nests in stouter and taller royal palms close to forest.

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Title Page Illustration

Palmchat (*Dulus dominicus*) nest in a cana palm tree (*Sabal domingensis*) at the Gates site on the Punta Cana Resort & Club, Punta Cana, Dominican Republic, photographed by André Dhondt in January 2020.

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