

TROPICAL KINGBIRD (*TYRANNUS MELANCHOLICUS*) FEEDING A FLEDGLING WITH BLUE PASSIONFLOWER (*PASSIFLORA CAERULEA*) FRUIT

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ABSTRACT.- The Tropical Kingbird (*Tyrannus melancholicus*) feeds mostly on flying insects, but it can also supply its diet with other arthropods, fruits, and even small vertebrates. Despite being one of the most common birds in the Neotropics, knowledge about its foraging behavior is scarce. In December 2020, we observed and videotaped an adult feeding a fledgling with pulp and seeds of Blue Passionflower (*Passiflora caerulea*) in Ranchos, northeastern Buenos Aires province, Argentina. The whole event lasted 3:37 min. This is the first time that this foraging and breeding behavior is reported for the Tropical Kingbird.

KEYWORDS: *frugivory, Ranchos, seed dispersal, Tyrannidae*

RESUMEN.- SUIRIRÍ REAL (*TYRANNUS MELANCHOLICUS*) ALIMENTANDO UN VOLANTON CON FRUTO DE PASIONARIA (*PASSIFLORA CAERULEA*). El Suirirí Real (*Tyrannus melancholicus*) se alimenta principalmente de insectos que captura en vuelo, aunque puede complementar su dieta con otros artrópodos, frutos e incluso pequeños vertebrados. A pesar de ser una de las aves más comunes del Neotrópico, los estudios sobre su comportamiento de forrajeo son escasos. En diciembre de 2020, observamos y grabamos en video a un adulto alimentando a un volatón con pulpa y semillas de frutos de Pasionaria (*Passiflora caerulea*) en Ranchos, noreste de la provincia de Buenos Aires, Argentina. El evento duró 3:37 minutos. Esta es la primera vez que se registra este comportamiento de forrajeo y alimentación en el Suirirí Real.

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Knowledge about the ecology of Neotropical birds is still scarce, particularly that related to foraging behavior (Stutchbury and Morton 2008). Although numerous studies have contributed with information on the ecology of Neotropical birds in the last decade (Stotz et al. 1996, Reboreda et al. 2019, Michel et al. 2020), this information is still limited compared with the data compiled about birds in temperate regions (Lees et al. 2020).

The Tropical Kingbird (*Tyrannus melancholicus*) is a common and widespread species in the Neotropics, ranging from southern North America to Argentina (Ridgely and Tudor 1989). It is found in a great variety of habitats including forest edges, open forests and even human-modified landscapes, from deserts to wet lowlands and at altitudes of more than 3000 masl (Stouffer et al. 2020). Both the northernmost and southernmost populations are migratory; the populations from Argentina migrate north during the southern winter after breeding (Stouffer et al. 2020). The Tropical Kingbird is mainly insectivorous and it is one of the most specialized flycatchers, foraging by sallying large insects (Fitzpatrick 1980, Mathura

et al. 2005, Jahn et al. 2010). Like other members of the family Tyrannidae, it often supplements its diet with fruits (Moermond and Denslow 1985, Palacio et al. 2017) and more rarely with vertebrates, such as fish (González-Oreja and Jiménez-Moreno 2018) and lizards (Ramírez-Fernández et al. 2019). Even though the Tropical Kingbird is a common, abundant, and conspicuous species in the Neotropics, its foraging ecology and diet remain poorly studied (Stouffer et al. 2020).

In this paper, we present the first record of fruit consumption by a Tropical Kingbird fledgling. In particular, we report observations of a Tropical Kingbird adult feeding a fledgling with a Blue Passionflower (*Passiflora caerulea*) fruit in northeastern Buenos Aires province, Argentina. We also provide detailed information about the foraging behavior observed, including fruit consumption rates and fruit-handling behavior.

Observations were made with a Sony HDR-CX440 handycam on 29 December 2020, at 7:08 h in the backyard of a house in Ranchos, Buenos Aires, Ar-

gentina (35°30'W, 58°19'S). The record was made in an urban, highly modified area on the outskirts of the town. The plant was located on a fence, and it was 4 m long and 2 m high; it bore 118 ripe fruits, 40 of which were pecked. One Tropical Kingbird adult arrived at the plant, it pecked one fruit and ingested some pulp and seeds (Fig. 1a). Sixteen seconds later, the first fledgling arrived begging (Fig. 1b) and it was fed by the adult seven times (Fig. 1c), while at the same time the adult also consumed pulp and seeds (Fig. 1d). Seeds could be clearly identified in the videos as oval shapes covered by red arils. Both the adult and the fledgling ingested the whole seeds, and in no case did the fledgling feed on its own. The adult pecked the same fruit an average of 2.14 ± 1.12 times per feeding bout (i.e., a sequence of pecking, extracting seeds, and swallowing), spending an average of 7.00 ± 5.34 s per bout (range = 2–12 s, $n = 8$). In contrast, the adult always pecked the fruit only once when feeding the fledgling (except on one occasion when it pecked the fruit twice), spending an average of 6.25 ± 3.01 s per bout (range = 2–16 s, $n = 8$). At 2:13 min, another fledgling arrived, but the Tropical Kingbird did not feed it, and after the second fledgling jumped next to the parent, both left. The adult came back after a few seconds and pecked a fruit by making a sally-hover maneuver.

Again, it did not feed the first fledgling and left immediately. Finally, the fledgling also flew away a few seconds later. The adult extracted an average of 2.33 ± 1.66 seeds covered by the pulp (range = 1–5 seeds, $n = 9$) in each peck, and the number of pecks was strongly correlated with the feeding bout duration ($r = 0.96$, $n = 8$, $P < 0.01$). These observations were restricted to those cases where seeds could be clearly identified. Overall, the whole sequence lasted 3:37 min.

Although the Tropical Kingbird is a typically insectivorous tyrant species, the role of fruits in its diet may be more important than previously thought, as several studies have reported occasional fruit consumption by this species (e.g., Francisco and Galetti 2001, Wütterich et al. 2001, Krügel et al. 2006, Allenspach and Dias 2012, Palacio 2017), highlighting the need for further studies focusing on its diet. Our record also shows that fruits are consumed not only by adults but also by fledglings. Moreover, the fruit-handling technique used, in which the seeds are ingested whole, suggests the Tropical Kingbird could be a legitimate seed disperser (Palacio et al. 2017). In addition to attracting fruit-eating birds by offering fleshy fruits (Palacio 2019), the Blue Passionflower also attracts arthropods that may be also important prey for birds.



Figure 1. Tropical Kingbird (*Tyrannus melancholicus*) feeding a fledgling with Blue Passionflower (*Passiflora caerulea*) fruit. (a) Adult pecking a Blue Passionflower fruit. The arrow indicates the pecked fruit that was behind some leaves. (b) Fledgling begging to the arriving adult. (c) Adult feeding the fledgling. (d) Adult with pulp and seeds in the bill (circle).

In particular, the Gulf Fritillary Butterfly (*Agraulis vanillae*), a specialist herbivore of Blue Passionflower (Simonetti and Devoto 2018), is a prey for the Tropical Kingbird (Pinheiro 1996, D. Zaffignani pers. obs.). Therefore, the Blue Passionflower is an important species providing not only direct (i.e., fruits), but also potentially indirect food resources (i.e., insects). Overall, the migratory status of the Tropical Kingbird, coupled with the consumption of a common native plant of both natural and human-modified habitats, suggests that this species could be a key neglected seed dispersal vector in the Neotropics.

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LITERATURE CITED

- ALLENSPACH N AND DIAS MM (2012) Frugivory by birds on *Miconia albicans* (Melastomataceae), in a fragment of cerrado in São Carlos, southeastern Brazil. *Brazilian Journal of Biology* 72:407-413
- FITZPATRICK JW (1980) Foraging behavior of Neotropical tyrant flycatchers. *Condor* 82:43-57
- FRANCISCO MR AND GALETTI M (2001) Frugivoria e dispersão de sementes de *Rapanea lancifolia* (Myrsinaceae) por aves numa área do cerrado do estado de São Paulo, sudeste de Brasil. *Ararajuba* 9:13-19
- GONZÁLEZ-OREJA JA AND JIMÉNEZ-MORENO FJ (2011) First record of piscivory in the Tropical Kingbird (*Tyrannus melancholicus*). *Huitzil* 19:281-284
- JAHN AE, LEVEY DJ, MAMANI AM, SALDIAS M, ALCOBA A, LEDEZMA MJ, FLORES B, VIDOZ JQ AND HILARION F (2010) Seasonal differences in rainfall, food availability, and the foraging behavior of Tropical Kingbirds in the southern Amazon Basin: foraging behavior of Kingbirds in Amazonia. *Journal of Field Ornithology* 81:340-348
- KRÜGEL MM, BURGER MI AND ALVES MA (2006) Frugivoria por aves em *Nectandra mesopotamica* (Lauraceae) em uma área de floresta estacional decidual no Rio Grande do Sul, Brasil. *Iheringia, Serie Zoologia* 96:17-24
- LEES AC, ROSENBERG KV, RUIZ-GUTIERREZ V, MARSDEN S, SCHULENBERG TS AND RODEWALD AD (2020) A roadmap to identifying and filling shortfalls in Neotropical ornithology. *Auk* 137:1-17
- MATHURA N, SHAWN O'GARRO S, THOMPSON D, HAYES FD AND NANDY FU (2005) Foraging behavior of two tyrant flycatchers in trinidad: the great kiskadee (*Pitangus sulphuratus*) and tropical kingbird (*Tyrannus melancholicus*). *Journal of Caribbean Ornithology* 18:18-21
- MICHEL NL, WHELAN CJ AND VERUTES GM (2020) Ecosystem services provided by Neotropical birds. *Condor* 122:1-12
- MOERMOND TC AND DENSLOW JS (1985) Neotropical avian frugivores: patterns of behavior, morphology, and nutrition, with consequences for fruit selection. *Ornithological Monographs* 36:865-897
- PALACIO FX (2017) *Aves frugívoras como agentes de selección natural sobre el despliegue de frutos en plantas*. Doctoral Thesis, Universidad Nacional de Tucumán, San Miguel de Tucumán
- PALACIO FX (2019) Hummingbirds (Trochilidae) as frugivores: a review and the first records from Argentina. *Ornitología Neotropical* 30:99-102
- PALACIO FX, VALOY M, BERNACKI F, SANCHEZ MS, NÚÑEZ-MONTELLANO MG, VARELA O AND ORDANO M (2017) Bird fruit consumption results from the interaction between fruit-handling behaviour and fruit crop size. *Ethology Ecology & Evolution* 29:24-37
- PINHEIRO CE (1996) Palatability and escaping ability in Neotropical butterflies: tests with wild kingbirds (*Tyrannus melancholicus*, Tyrannidae). *Biological Journal of the Linnean Society* 59:351-365
- RAMÍREZ-FERNÁNDEZ JD, BIAMONTE E, GUTIÉRREZ-VANNUCCI AC, SARRIA-MILLER GA, SCOTT A AND SANDOVAL L (2019) Previously undescribed food resources of eleven neotropical bird species. *Boletín SAO* 28:1-8
- REBOREDA JC, FIORINI VD AND TUERO DT (2019) *Behavioral ecology of Neotropical birds*. Springer, Cham
- RIDGELY RS AND TUDOR G (1989) *The birds of South America: Volume 1: the oscine passerines* (Vol. 1). University of Texas Press, Austin
- SIMONETTI G AND DEVOTO M (2018) La defensa de *Passiflora caerulea* por hormigas reduce el número de huevos y larvas de *Agraulis vanillae*, pero no el daño por herbivoría. *Ecología Austral* 28:123-132
- STOTZ DF, FITZPATRICK JW, PARKER III TA AND MOSKOVITS DK (1996) *Neotropical birds: ecology and conservation*. University of Chicago Press, Chicago
- STOUFFER PC, CHESSER RT AND JAHN AE (2020) Tropical Kingbird (*Tyrannus melancholicus*). Version 1.0. in: BILLERMAN SM, KEENEY BK, RODEWALD PG AND SCHULEN-

- BERG TS (eds) *Birds of the World*. Cornell Lab of Ornithology, Ithaca
- STUTCHBURY BJM AND MORTON ES (2008) Recent advances in the behavioral ecology of tropical birds. *Wilson Journal of Ornithology* 120:26-37
- WÜTTERICH A, AZÓCAR A, GARCÍA-NÚÑEZ C AND SILVA JF (2001) Seed dispersal in *Palicourea rigida*, a common treelet species from neotropical savannas. *Journal of Tropical Ecology* 17:449-458