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Honeydew foraging by birds in an Atlantic Forest fragment of Minas Gerais State, Brazil

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Abstract: Honeydew foraging by birds has been extensively documented in recent years. However, this interaction has been poorly documented in Brazil, with predominance of few species of birds foraging only in Mimosa scabrella trees. With the objective of describing the behavior of birds interacting with scale insects associated with trees, we conducted a study at the Serra de São José, Tiradentes, in the State of Minas Gerais, Brazil. Observations were recorded from June to July 2012. We observed 13 species of birds feeding on honeydew scale insects, eight never previously recorded. We observed individuals using aerial and surface maneuvers to collect the honeydew on the branches or reaching the droppings below the branches. These species were observed foraging individually, in pairs and also in large groups. Our results suggest that honeydew excretion from scale insects associated with Pseudopiptadenia leptostachya trees represents an important energy source for local birds as observed in fragments of Atlantic Forest in the Minas Gerais State, southeast region of Brazil.

Keywords: trophic connections, excretion, insects, behavior maneuvers, Serra de São José.


Resumo: O uso de excreções líquidas açucaradas por aves tem sido amplamente divulgado nos últimos anos. No entanto, estudos acerca desta interação são escassos no Brasil, sendo que os poucos existentes relatam apenas algumas espécies de aves forrageando a excreção de insetos presentes em uma única espécie de árvore (Mimosa scabrella). Com o objetivo de descrever o comportamento de aves interagindo com insetos excretores de líquidos açucarados associados com árvores, nós conduzimos um estudo na Serra de São José, município de Tiradentes em Minas Gerais, Brasil. Nossas observações foram feitas de Junho a Julho de 2012 e 13 espécies de aves foram registradas forrageando a excreção, sendo que oito delas nunca haviam sido anteriormente registradas envolvidas neste tipo de interação. Nós observamos indivíduos usando manobras aéreas e na superfície das árvores para coletar a excreção nos galhos ou alcançar goticulas debaixo dos troncos. Estas espécies foram observadas forrageando individualmente, em pares ou em grandes grupos. Nossos resultados sugerem que a excreção açucarada excretada por insetos associados com árvores mamica-de-porca (Pseudopiptadenia leptostachya), representa uma importante fonte de energia para as aves, conforme observado em fragmentos de mata Atlântica no Estado de Minas Gerais, sudeste do Brasil.

Palavras-chave: conexões tróficas, excreção, insetos, manobras comportamentais, Serra de São José.
Introduction

Honeydew foraging by birds has been extensively documented as a result of an important interaction with scale insects (Hemiptera, Coccoidea) (Gamper & Koptur 2010, Beggs 2001, Gaze & Clout 1983, Greenberg et al. 1993, Jirón & Salas 1975, Koster & Stoewensand 1973, Latta et al. 2001, Murphy & Kelly 2003, Paton 1980, Woinarski 1984). Scale insects need large amounts of phloem to fulfill their nutrient demands and therefore excrete large amounts of honeydew, which is sugary waste rich in carbohydrates and amino acids. The excretion is done through small drops of honeydew at the end of a long anal filament (Williams & Williams 1980). In some ecosystems, the use of honeydew by ants, wasps and bees has been recorded (Bach 1991, Moller & Tilley 1989, Didham 1993). The use of honeydew may represent the primary source of carbohydrates to a large array of wildlife and may improve trophic connections (Grant & Beggs 1989).

In Brazil honeydew foraging by birds has been poorly documented, with predominance of scale insects associated with bracatinga trees (Mimosa scabrella Benth). Species of hummingbirds such as Leucoclorhis albicollis (Vieillot, 1818) and Chlorostilbon lucidus (Shaw, 1812) have been recorded foraging on scale insects mostly in the Santa Catarina State, south region of the country (Reichhoff & Reichhoff 1973). Besides hummingbirds, groups of other species of birds, such as L. albicolius, Parula pityayumi (Vieillot, 1817), Tangara persiana (Desmarest, 1806), Stephanophorus diadematous (Temminck, 1823), Tachyphonus coronatus (Vieillot, 1822), Saltator similis (d’Orbigny & Lafresnaye, 1837) and Zonotrichia capensis (Müller, 1776) have been recorded foraging in one bracatinga tree of approximately 12 meters, in the northern area of Santa Catarina State (Sick 1988, L.A. Rosário pers. comm.). In another occasion, a group comprised of eight maroon-bellied parakeets (Pyrrhura frontalis, Vieillot, 1817), was also recorded in one Mimosa scabrella tree in the highland forests of the same State (Rosário 1996). Our objective was to describe the behavior of birds interacting with scale insects associated with trees in the southeastern region of Brazil and discuss the importance of this interaction.

Material and Methods

This study was conducted at the Serra de São José, a mountain range near the town of Tiradentes, in the State of Minas Gerais, Brazil. The region is located in the ecotone of the Cerrado and semi-deciduous portions of the Atlantic Forest (Oliveira-Filho & Machado 1993). The vegetation is very diversified (Carvalho et al. 1994), originally comprised by a complex mosaic of forest patches, Cerrado and opens fields of campos rupestres (Eiten 1982). The tropical climate of the region is characterized by rainy summers and dry winters. Mean annual precipitation and temperature at the base of the mountain range were 1,514-1,588 mm and 19.3-20.1 °C respectively, whereas at the upper montane area were 1,536-1,605 mm and 14.8-18.6 °C (Pereira et al. 2007). Approximately 70% of the rains occur between November and February.

The fragment where observations were recorded was located at an altitude of approximately 1000 meters (21° 6’ 6.79” S and 44° 10’ 53.30” W) in a semi-deciduous fragment of forest along the southern border of the study area. The fragment was comprised by medium-sized trees of approximately 16 meters in the interior portion of the semi-deciduous forest.

Observations were recorded from June (15th, 17th, 18th, 19th and 26th) to July (7th), 2012. The number of birds visiting the trees, species and total time spent in the tree by each bird, were recorded during 3 hours observation periods. Observations were made using binoculars (Bushnell 8×40 mm) during the first hours of the morning (7:00-10:30 hours) and between 15:00-17:30 hours in the afternoon. All the birds visiting the trees were followed visually to determine whether they were feeding on scale insect honeydew or performing another sort of behavior. Feeding behaviors or intraspecific interactions (chasing behavior or physical contact) not direct related to honeydew feeding were recorded by taking photographs (Canon Powershot SX30) of birds. We assumed that each picture corresponded to one independent event of feeding behavior since individual identification of birds was not accomplished visually.

To guide our interpretation of different behaviors performed by the birds, we use descriptions suggested by Volpato & Mendonça-Lima (2002), based on Remsen & Robinson (1990).

Results

We recorded a total of 16 bird species visiting trees during our six different observation periods (four periods during the mornings of 15, 17, 26 of June, and 07 of July, and two in the afternoons of 18 and 19 of June). Of those 16 bird species, 13 (81%) were observed feeding on honeydew scale insects (Table 1). All individual observation trees were determined to be Pseudopiptadenia leptostachya (Benth). The other three species were visiting the trees to either feed on other species of insects (Florisuga fusca Vieillot, 1817, and Sittamosus griseicapillus Vieillot, 1818) or just resting (Amazilia versicolor Vieillot, 1818). All bird species were considered resident to the study area.

Honeydew feeding behavior differed among observed birds. On four periods (15, 17, 18 and 26 of June) we observed single individuals of five species (Leucoclorhis albicollis, Amazilia lacteal, Lesson, 1832, Thalaranina glaukopis Gmelin, 1788, Tangara cyanoventris Vieillot, 1819, and Chlorostilbon lucidus) using sally-hover aerial maneuvers for feeding on honeydew. Among these species, only Leucoclorhis albicollis was observed foraging in large numbers of approximately twelve individuals.

Other eight species of birds were observed foraging honeydew using surface maneuvers either gleaning to collect the honeydew on the branches or reaching the droppings below the branches. These species were observed on three periods (17 and 26 of June and 07 of July) foraging individually (Tangara palmarum Wied, 1823, Dacnis

Table 1. Bird species visits to scale insects on mamica-de-porca trees in a semi-deciduous fragment of forest at the Serra de São José, Minas Gerais State, Brazil (June to July, 2012). The use of honeydew is indicated by Y = yes, N = no. Behavior status (A = aerial, S = surface).

<table>
<thead>
<tr>
<th>Species</th>
<th>Use of honeydew</th>
<th>Behavior type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leucoclorhis albicollis</td>
<td>Y</td>
<td>A</td>
</tr>
<tr>
<td>Chlorostilbon lucidus</td>
<td>Y</td>
<td>A</td>
</tr>
<tr>
<td>Parula pityayumi</td>
<td>Y</td>
<td>S</td>
</tr>
<tr>
<td>Tachyphonus coronatus</td>
<td>Y</td>
<td>S</td>
</tr>
<tr>
<td>Amazilia lacteal</td>
<td>Y</td>
<td>A</td>
</tr>
<tr>
<td>Thalaranina glaukopis</td>
<td>Y</td>
<td>A</td>
</tr>
<tr>
<td>Tangara sayaca</td>
<td>Y</td>
<td>S</td>
</tr>
<tr>
<td>Tangara cayana</td>
<td>Y</td>
<td>S</td>
</tr>
<tr>
<td>Tangara cyanoventris</td>
<td>Y</td>
<td>A</td>
</tr>
<tr>
<td>Coereba flavoea</td>
<td>Y</td>
<td>S</td>
</tr>
<tr>
<td>Tangara palmarum</td>
<td>Y</td>
<td>S</td>
</tr>
<tr>
<td>Dacnis cayana</td>
<td>Y</td>
<td>S</td>
</tr>
<tr>
<td>Hemithraupis ruficapilla</td>
<td>Y</td>
<td>S</td>
</tr>
<tr>
<td>Florisuga fusca</td>
<td>N</td>
<td>-</td>
</tr>
<tr>
<td>Sittamosus griseicapillus</td>
<td>N</td>
<td>-</td>
</tr>
<tr>
<td>Amazilia versicolor</td>
<td>N</td>
<td>-</td>
</tr>
</tbody>
</table>
Honeydew foraging by birds

Of the thirteen bird species recorded by this study, eight had not been previously recorded foraging on honeydew. There has been a known interaction between Coereba flaveola and scale insects (Coccoidea) in the subtropical dry forests of Dominican Republic (Latta et al. 2001). However, this is the first report recording the use of honeydew by this species in Brazil. For the species recorded in our study, previous reports indicate the use of honeydew by only Leucocloris albicollis, Chlorostilbon lucidus (Reichhoff & Reichhoff 1973, Sick 1988), Parula pitiayumi and Tachyphonus coronatus (Sick 1988). Moreover, all reports have occurred in the Santa Catarina State, in the south of Brazil and only in the Mimosa scabrella trees. Our results suggest that honeydew excetration associated with Pseudopiptadenia leptostachya trees represent an important energy source for local birds as observed in fragments of Atlantic Forest in the Minas Gerais State, southeastern region of Brazil.

Despite the apparent importance and relevance of the behaviors herein documented, studies about the use of honeydew by birds in Brazil are scant. Some aspects such as seasonality of honeydew foraging, identification of other insects involved in the interactions and behavioral aspects of the foraging are unknown and more studies should be performed to elucidate the importance of such resource for birds.

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**References**


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