

Frugivory by birds on two exotic *Ligustrum* species (Oleaceae) in Brazil

Daniel Ricardo Scheibler¹ and Tadeu Artur de Melo-Júnior^{1,2}

¹ Departamento de Zoologia, Universidade Estadual Paulista, Avenida 24A, 1515, 13506-900, Rio Claro, SP, Brasil.

² Zoologia de Vertebrados, Departamento de Biologia, Universidade de Franca, Avenida Dr. Armando Salles de Oliveira, 201, 14404-600, Franca, SP, Brasil.

Recebido em 05 de novembro de 2002; aceito em 24 de fevereiro de 2003.

RESUMO. Frugivoria por aves em duas espécies exóticas de *Ligustrum* (Oleaceae) no Brasil. Nós registramos as aves que se alimentavam de frutos das plantas exóticas *Ligustrum lucidum* em Venâncio Aires, sul do Brasil, e de *L. japonicum* na cidade de Belo Horizonte, sudeste do Brasil. Os frutos de ambas as espécies foram principalmente consumidos por sabiás: *Turdus amaurochalinus* e *T. albicollis* em Venâncio Aires, *T. leucomelas* e *T. rufiventris* em Belo Horizonte. Na região sul do Brasil, o intenso uso dos frutos de *L. lucidum* sugere a sua importância como recurso alimentar no inverno para algumas populações de aves residentes. Já na área urbana de Belo Horizonte, os frutos de *L. japonicum* podem ser importantes para a manutenção das aves frugívoras naquela cidade durante sua frutificação.

PALAVRAS-CHAVE: Brasil, frugivoria, *Ligustrum* spp., plantas exóticas, *Turdus* spp.

KEY WORDS: Brazil, exotic plants, frugivory, *Ligustrum* spp., *Turdus* spp.

Exotic plants have been introduced in practically all parts of the world, and their fruits could represent an alternative food source for the native fauna. White and Stiles (1992) state that introduced fruits now rival native species in the fruit diet of birds in late fall and winter in eastern North America. In the Neotropical region there are few studies evaluating the importance of exotic fruits for the native fauna diet. In southeastern Brazil, Figueiredo *et al.* (1995) recorded 31 species of birds feeding on fruits of the exotic *Ficus microcarpa*, while Marcondes-Machado *et al.* (1994) recorded 23 bird species eating fruits on that species. Lombardi and Motta-Junior (1993) found 19 bird species consuming the arillate seeds of *Michelia champaca*, which constitute an alternative food source for birds at the beginning of the dry season in southeastern Brazil.

The genus *Ligustrum* (Oleaceae) comprises bushes and small trees, most of which have their origin in oriental Asia, being cultivated frequently in several parts of the world, especially in warm and temperate climates (Milano 1949). In Argentina, two species have invaded natural habitats: *L. sinense* (Montaldo 1993), and *L. lucidum* (Dascanio *et al.* 1994, Montaldo 1993, 2000, Ribichich and Protomastro 1998). Montaldo (1993) found that 11 resident species of birds ate the fruits of *Ligustrum* spp. in the Buenos Aires province. *Ligustrum lucidum* had small fleshy fruits (8 mm diameter) (Milano 1949), and are violet-blue. Fruits of *L. japonicum* are similar in size, shape and color to the *L. lucidum*. In Brazil, both species are frequently cultivated, however, there is no information about the importance of their fruits in the diet of the native fauna.

In this paper, we recorded birds feeding on fruits of *L. lucidum* in Venâncio Aires county, southern Brazil, and of *L. japonicum* in Belo Horizonte city, southeastern Brazil. We discuss the importance of these exotic fruits to native birds.

METHODS

Study sites. Venâncio Aires county is located in Rio Grande do Sul state, southern Brazil (29°36'S, 52°11'W), and Belo Horizonte city in Minas Gerais state, southeastern Brazil (19°55'S, 46°56'W). The study site at Venâncio Aires is a rural area constituted by a mosaic of different environments, including grain cultivation, small eucalyptus plantations, and small areas of secondary and primary native subtropical forest. In Belo Horizonte, records were made in the urban region called Renascença. Rizzini (1979) detailed the vegetation characteristics for the Belo Horizonte region, and Fundação IBGE (1986) did the same for the Venâncio Aires region.

Sampling. In Venâncio Aires, we observed 11 *L. lucidum* plants during seven consecutive days in August 1999 for a total of 32 h of observation. Bird records were made through 58 walks lasting on average 33 min conducted from 07:00 to 17:00, on a 350 m trail that covered the 11 individuals of *L. lucidum*. Each record corresponds to an individual bird present on a plant observed eating fruits. In Belo Horizonte, we made focal observation in May and June 1998 on four *L. japonicum* plants for a total of 20 h of observation.

Statistical analysis. We compared bird records on *L.*

lucidum per observation period (n = 58) for the five bird species whose records were more frequent in Venâncio Aires. Records were statistically tested with Kruskal-Wallis's analysis of variance and subsequently Dunn's multiple comparisons.

RESULTS

We recorded 10 bird species feeding on fruits of *L. lucidum* in Venâncio Aires, and seven on fruits of *L. japonicum* in Belo Horizonte (table 1). In Venâncio Aires, the number of bird records on *L. lucidum* differed significantly between the five bird species tested: Creamy-bellied Thrush (*Turdus amaurochalinus*), White-necked Thrush (*Turdus albicollis*), Rufous-bellied Thrush (*Turdus rufiventris*), Yellow-bellied Elaenia (*Elaenia flavogaster*) and Highland Elaenia (*Elaenia obscura*) (H = 143.38, $p < 0.001$, Kruskal-Wallis ANOVA). *Turdus amaurochalinus* was the most recorded *L. lucidum* fruit-eating bird, and secondarily *T. albicollis* (figure 1) (see table 2 for results of Dunn's multiple comparisons).

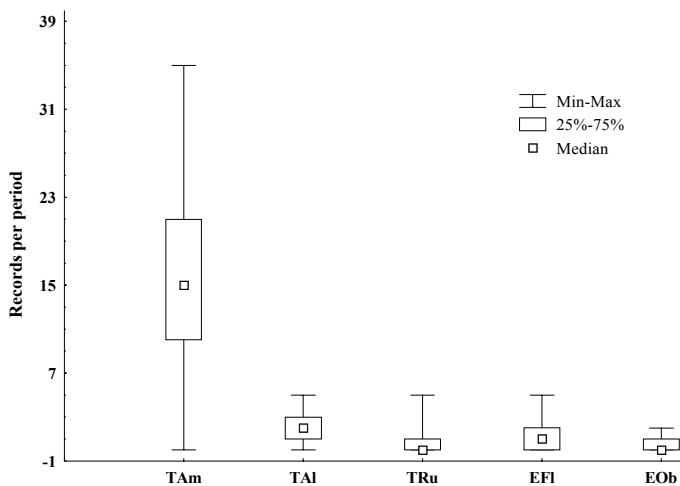


Figure 1. Distribution of bird records on *Ligustrum lucidum* per observation period for its main fruit-eating birds in Venâncio Aires county, Rio Grande do Sul state, southern Brazil. (Tam) *Turdus amaurochalinus*, (Tal) *Turdus albicollis*, (Tru) *Turdus rufiventris*, (Efl) *Elaenia flavogaster*, (Eob) *Elaenia obscura*. See table 2 for statistic tests.

DISCUSSION

In spite of the differences of the sampling methods we used, as well as of the *Ligustrum* species, in both Brazilian sites *Ligustrum* fruits were regularly consumed by *Elaenia* spp., however, *Turdus* spp. were the main *Ligustrum* fruit-eating birds. Montaldo (1993) found that during the *L. lucidum* and *L. sinense* fruiting season in the Buenos Aires province, Argentina, *T. rufiventris* was the most abundant *Ligustrum* fruit-eating bird at the study site, and *T. amaurochalinus* was also common. *Turdus* spp. seem

Table 1. Birds observed feeding on *Ligustrum lucidum* fruits in Venâncio Aires county, Rio Grande do Sul state, southern Brazil, and on *Ligustrum japonicum* in Belo Horizonte city, Minas Gerais state, southeastern Brazil.

Species	Venâncio Aires		Belo Horizonte	
	visits	Total (%)	visits	Total (%)
Tyrannidae				
<i>Elaenia flavogaster</i>	63	5.5	11	14.1
<i>Elaenia obscura</i>	26	2.3	–	–
<i>Myiarchus ferox</i>	–	–	3	3.8
<i>Pitangus sulphuratus</i>	11	1.0	4	5.1
Pipridae				
<i>Schiffornis virescens</i>	11	1.0	–	–
Muscicapidae				
<i>Turdus albicollis</i>	104	9.1	–	–
<i>Turdus amaurochalinus</i>	885	77.3	–	–
<i>Turdus leucomelas</i>	–	–	38	48.8
<i>Turdus rufiventris</i>	36	3.1	15	19.2
Mimidae				
<i>Mimus saturninus</i>	2	0.2	1	1.3
Thraupidae				
<i>Thraupis sayaca</i>	3	0.3	6	7.7
Emberizidae				
<i>Saltator similis</i>	2	0.2	–	–
Totals	1,143	100.0	78	100.0

to be particularly benefited by the presence of exotic plants on its habitat, and the exotic fruits could in fact represent an alternative or additional food source for these birds in some regions. In southeastern Brazil, *T. leucomelas* was also an important consumer of the exotic arillate seeds of *Michelia champaca* (Lombardi and Motta-Junior 1993), and fruits of *Ficus microcarpa* (Figueiredo *et al.* 1995).

We did not evaluate the frequency of visits nor the number of fruits eaten by birds in each visit on *L. lucidum*. However, we observed that birds visited the plants in high frequency and numbers, especially *T. amaurochalinus* which ingested several fruits during each visit. According to Montaldo (2000), *L. lucidum* fruits have a low pulp/seed ratio and provide only few profitable nutrients for birds, including lipids. However, the plants present a great

Table 2. P values found in Dunn's multiple comparisons for the five main *Ligustrum lucidum* fruit-eating birds in Venâncio Aires county, Rio Grande do Sul state, southern Brazil. (Tam) *Turdus amaurochalinus*, (Tal) *Turdus albicollis*, (TRu) *Turdus rufiventris*, (Efl) *Elaenia flavogaster*, (Eob) *Elaenia obscura*, (***) $p < 0.001$, (**) $p < 0.01$, (ns) not significant, $p > 0.05$.

	TAm	TAl	TRu	EFl
TAl	***			
TRu	***	**		
EFl	***	ns	ns	
EOb	***	***	ns	ns

amount of fruits per unit area, which in central Argentina may be responsible for the fact that the population density of some birds increase in winter despite the low availability of native fruits (Montaldo 1993). At the Paraná River Delta Region, in Argentina, Merler *et al.* (2001) state that *L. lucidum* is a potential alternative food source in winter for the Dusky-legged Guan (*Penelope obscura obscura*). In southern Brazil, the intense use of *L. lucidum* fruits, especially by *Turdus* spp., also suggests their importance as a food source in winter for some resident bird populations. In urban areas like Belo Horizonte, fruits of exotic plants like *L. japonicum* can possibly play an important role in the maintenance of fruit-eating birds in this city.

In Argentina, where *T. rufiventris* is its main avian seed disperser (*T. amaurochalinus* and *P. sulphuratus* have also some importance) (Montaldo 1993), *L. lucidum* has invaded natural habitats (Dascanio *et al.* 1994, Montaldo 1993, 2000, Ribichich and Protomastro 1998). In Venâncio Aires, *L. lucidum* is invading disturbed areas such as second-growth vegetation or 'capoeiras' (pers. obs.). It is very likely that the seeds of *L. lucidum* are also dispersed by birds, especially *Turdus* spp. To evaluate this, we suggest further studies in southern Brazil, examining bird droppings for the presence of viable seeds, and conducting germination experiments.

ACKNOWLEDGEMENTS

We thank Dr. Marco Aurélio Pizo Ferreira, Dr. Mauro Galetti, Dr. Edwin O'Neill Willis, and Dr. Francisco Manoel de Souza Braga (UNESP, Rio Claro) for reviewing the manuscript and valuable comments.

REFERENCES

- Dascanio, L. M., M. D. Barrera and J. L. Frangi (1994) Biomass structure and dry matter dynamics of subtropical alluvial and exotic *Ligustrum* forests at the Río de la Plata, Argentina. *Vegetatio* 115:61-76.
- Figueiredo, R. A., J. C. Motta-Junior and L. A. Silva-Vasconcellos (1995) Pollination, seed dispersal, seed germination and establishment of seedlings of *Ficus microcarpa*, Moraceae, in southeastern Brazil. *Rev. Brasil. Biol.* 55:233-239.
- Fundação IBGE (1986) *Levantamento de Recursos Naturais, folha SH.22 Porto Alegre e parte das folhas SH.21 Uruguaiana e SI.22 Lagoa Mirim*. Rio de Janeiro: Fundação IBGE.
- Lombardi, J. A. and J. C. Motta-Junior (1993) Seeds of the champak, *Michelia champaca* L. (Magnoliaceae), as a food source for Brazilian birds. *Ciência e Cultura* 45:408-409.
- Marcondes-Machado, L. O., S. J. Paranhos and Y. Melo-Barros (1994) Estratégias alimentares de aves na utilização de frutos de *Ficus microcarpa* (Moraceae) em uma área antrópica. *Iheringia, Sér. Zool.*, 77:57-62.
- Merler, J. A., M. A. Diuk-Wasser and R. D. Quintana (2001) Winter diet of Dusky-legged Guan (*Penelope obscura*) at the Paraná River Delta Region. *Stud. Neotrop. Fauna Environ.* 36:33-38.
- Milano, V. A. (1949) Las especies del genero "*Ligustrum*" cultivadas en la Argentina. *Rev. Investig. Agríc.* 3:353-380.
- Montaldo, N. H. (1993) Dispersión por aves y éxito reproductivo de dos especies de *Ligustrum* (Oleaceae) en un relicto de selva subtropical en la Argentina. *Rev. Chilena Hist. Nat.* 66:75-85.
- Montaldo, N. H. (2000) Exito reproductivo de plantas ornitócoras en un relicto de selva subtropical en Argentina. *Rev. Chilena Hist. Nat.* 73:511-524.
- Ribichich, A. M. and J. Protomastro (1998) Woody vegetation structure of xeric forest stands under different edaphic site conditions and disturbance histories in the Biosphere Reserve 'Parque Costero del Sur', Argentina. *Plant Ecol.* 139:189-201.
- Rizzini, C. T. (1979) *Tratado de fitogeografia do Brasil*, v. 2. São Paulo: HUCITEC, USP.
- White, D. W. and E. W. Stiles (1992) Bird dispersal of fruits of species introduced into eastern North America. *Canad. J. Bot.* 70:1689-1696.