ORNITOLOGIA NEOTROPICAL 15: 299–306, 2004

DIET COMPOSITION OF THE WHITE-BROWED BLACKBIRD (*STURNELLA SUPERCILIARIS*) AT BUENOS AIRES PROVINCE, ARGENTINA

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Resumen. – Composición de la dieta del Pecho Colorado *Sturnella superciliaris* en la provincia de Buenos Aires, Argentina. – El propósito de este trabajo fue analizar la composición cuali-cuantitativa de la dieta del Pecho Colorado (*Sturnella superciliaris*) a lo largo de su ciclo reproductivo. El espectro trófico está basado en la identificación de 41 ítems presa, de los cuales el 73% correspondió a la fracción animal y el 27% a la vegetal. Los insectos representaron el 93% del volumen de los contenidos estomacales analizados, siendo los Lepidoptera, Coleoptera y Orthoptera los grupos predominantes. Nuestros resultados indicaron que no existen diferencias significativas entre la composición dietaria de primavera y la de verano aunque, en la última estación, la dieta es más diversa y la amplitud del nicho es mayor. El tamaño de la presa está limitado por la anchura máxima de las mandíbulas.

Abstract. – We studied the qualitative and quantitative diet composition of the White-browed Blackbird (*Sturnella superciliaris*) throughout the breeding cycle. The trophic spectrum is based on the identification of 41 prey items, of which 73% correspond to the animal fraction, and 27% to plant materials. Insecta, mainly Lepidoptera, Coleoptera and Orthoptera, constituted the bulk of the diet in both seasons, representing 93% of the volume of the stomach contents. Our results indicated that differences in the diet composition between seasons were not significant although, during summer, higher diversity values and wider niche breadth were found. Prey size is limited by the maximum width of the mandibles. *Accepted 2 January 2004.*

Key words: Diet, White-browed Blackbird, *Sturnella superciliaris*, Argentina, Insecta.

INTRODUCTION

The White-browed Blackbird (*Sturnella superciliaris*) inhabits from northern Argentina to Río Negro province (Canevari *et al.* 1991). In others regions of South America, it ranges through the southeastern extreme of Perú, east of Bolivia, south and east of Brazil, Paraguay and Uruguay (Camperi 1987, Ridgely & Tudor 1994).

White-browed Blackbirds inhabit natural and cultivated fields, grasslands and wetlands. During the breeding period, they are found in pairs whereas, in the rest of the year, they form small flocks of between ten and twelve individuals, although they can remain solitary during the whole year. In the province of Buenos Aires, they are more abundant during the breeding period, with their number being reduced from April or May. They disappear from the region during winter when they migrate to the north.

TABLE 1. Composition of the diet of White-browed Blackbirds (*Sturnella superciliaris*) in the Buenos Aires province, as reflected by the analysis of stomach contents (n = 34). Frequency of occurrence (F%), importance by number (N%) and reconstituted volume (RV%) per cent.

	F%	N%	RV%
Insecta	100	34.5	92.9
Arachnida	20.6	0.9	4.5
Plant materials	61.8	64.6	2.6

Although there is some published information about the biology and geographical distribution of the White-browed Blackbird (Sclater & Hudson 1888, Gibson 1918, Castellanos 1934; Pereyra 1937, 1938), references about its diet are very partial and refer only to qualitative aspects (Marelli 1919, Aravena 1928; Zotta 1936, 1940; Camperi 1984).

The objective of this study was to analyze the diet composition of this species throughout the breeding cycle (spring and summer) and its possible seasonal variations.

METHODS

A total of nine field visits were conducted at a grassland zone located between La Balandra (34º58'S, 57º42'W) and Punta Blanca (34º59'S, 57º40'W) localities (District of Magdalena).

Specimens of the White-browed Blackbird were shot; they were also used for internal parasite studies, as as for the detection of heavy metals. The stomachs were extracted in the field, and fixed with alcohol up to 70%. In the laboratory, stomach content volume was obtained by displacement, and the remains of the different organisms were separated using a binocular microscope. These materials were determined to the lowest possible taxonomic category and quantified. Indeterminate material was not considered for the analysis. Each item was determined using reference specimen collections, then measured (length and maximum width) for volume reconstitution (Duffy & Jackson 1986). Hemiptera and Homoptera were considered in the most classic sense. Nowadays both orders are combined into the Hemiptera (Carver *et al.* 1991).

The relative importance index (RII) was used to establish the contribution of each item to the diet of blackbirds. It was calculated as RII = $(N_i + V_i) \times F_i$, where N_i is the percentage by number of prey type i, V_i is percentage by volume of prey type i, and F_i is the frequency of occurrence of prey type i (Pinkas *et al.* 1971 *fide* Duffy & Jackson 1986). Stomach contents were grouped according to seasons, spring and summer, for comparing the qualitative and quantitative composition of the diet.

Food niche breadth (FNB) was estimated using Levins (1968) index: FNB = $1/(Sp_i^2)$, where p_i is the proportion of prey taxon i in the diet. A standardized-niche breadth value (FNBst), ranging from 0 to 1, was calculated according to the following formula: FNBst = (FNB – 1)/(n – 1), where n is the total number of prey categories (Colwell & Futuyma 1971).

Specific diversity was calculated using the Shannon & Weaver (1949) index, while evenness or equitability of the preys found in food samples was estimated following the formula F = (N2 – 1)/(N1 – 1) (Alatalo, 1981), where N1 is the antilog of Shannon`s index and N2 is the reciprocal of Simpson´s index $(1/Sp_i^2)$, being p_i the relative proportion of each member of the community assemblage being investigated.

RESULTS

Stomach contents analysis. Thirty-four stomachs corresponding to specimens obtained between 1992 and 1996, 15 in the spring (October to December) and 19 during the

TABLE 2. Preys items found in stomach contents of White-browed Blackbirds throughout the reproductive cycle. N = number of items, V = reconstituted volume (cm^3), FO = frequency of occurrence (%).

	Spring			Summer		
	N	V	FO	N	V	FO
INSECTA						
LEPIDOPTERA						
Geometridae				13	4.03	
Geometridae (larva)	-	-	-	13		2
Heterocera (pupa)	1	0.25	1	-	-	-
Lepidoptera (larva)	36	11.16	8	56	17.36	13
COLEOPTERA						
Curculionidae	74	3.43		19	0.88	
Curculionidae sp.	47		8	15		10
Brachyderinae sp.	7		4	1		1
Calendrinae sp.	20		9	3		3
Dynastidae	18	4.08		16	3.84	
Dynastidae (larva)	13		5	10		5
Dyscinetus sp.	3		3	5		4
Lygirus sp.	2		2	1		1
Chrysomelidae	7	0.10		8	0.12	
Eumolpinae sp.	7		4	5		3
Cassidinae sp.	-		-	3		2
Carabidae	3	0.45				
Scarites anthracinus	3		1	-		-
Coleoptera sp.	10	1.20	8	8	0.96	4
ORTHOPTERA						
Acridiidae	3	0.45		62	9.30	
Acridiidae sp.	3		3	62		13
Gryllidae				4	0.66	
Gryllinae sp.	-	-	-	4		3
Conocephalidae				3	1.12	
Conocephalus sp.	-	-	-	2		2
Neoconocephalus sp.	-	-	-	1		1
HEMIPTERA						
Lygaeidae				2	0.02	
Geocoris sp.	-	-	-	2		1
Pentatomidae	9	1.26		3	0.42	
Pentatomidae sp.	9		6	3		3
HOMOPTERA						
Cicadellidae	2	0.04				
Cicadellidae sp.	2		1	-	-	-
Cercopidae				1	0.66	
Cercopidae sp.	-	-	-	1		1
Gyponidae				1	0.55	
Gyponidae sp.	-	-	-	1		1
Fulgoroidea sp	2	0.08	2	3	0.12	2

TABLE 2. Continued

	Spring			Summer		
	N	V	FO	N	V	FO
DIPTERA						
Tipulidae	1	0.013				
Tipulidae sp.	1		1			
MANTODEA						
Mantidae				1	0.64	
Mantidae sp.	-	-	-	1		1
PLECOPTERA						
Plecoptera sp.				1	0.04	1
ARACHNIDA						
ARANEIDA						
Araneidae	1	0.30		2	0.60	
Araneidae sp.	1		1	2		1
Thomisidae	1	0.30				
Thomisidae sp.	1		1	-	-	-
Lycosidae	3	0.90				
Lycosidae sp.	3		2	-	-	-
Araneida sp.	2	0.60	2	1	0.30	1
PLANT MATERIALS						
DICOTYLEDONEAE						
ASTERALES						
Asteraceae				92	0.44	
Ambrosia tenuifolia	-		-	52		2
Cirsium vulgarae	-		-	40		2
MONOCOTYLEDONEAE						
CYPERALES						
Poaceae	565	1.07		27	0.12	
Panicum sp.	417		3	3		3
Setaria sp.	4		1	1		1
Lolium multiflorum	5		1	5		3
Stipa sp.	117		3	7		2
Hordeum sp.	-		-	10		4
Piptochaetium stipoides	17		1	-		-
Polypogon elongatus	5		1	-		-
Poaceae sp.	-		-	1		1
Cyperaceae	29	0.11				
Carex sp.	29		2	-		-

summer (January to March), were analyzed. In addition, information about sex and measurements of bill were obtained. All the stomachs analyzed (n = 34) contained food items. Indeterminate material represented 6% of the total content. The mean reconstituted volume of the samples was 2.0 cm^3 (SD = 1.1, range = 0.6–4.3, n = 34) and contained an average of 31 preys (SD = 50.2, range = 4–211, n = 1064).

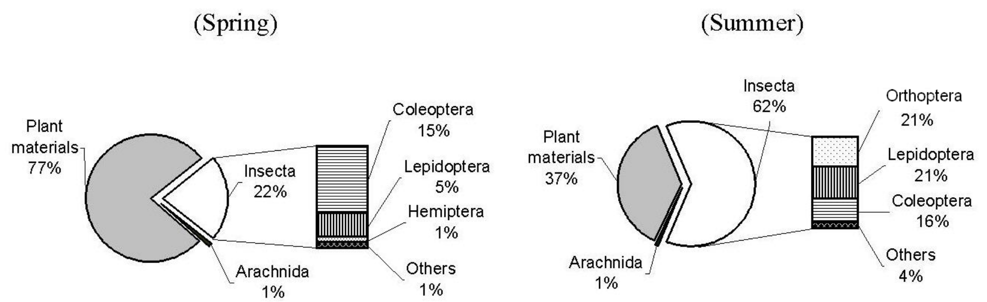

FIG. 1. Percentage by number for each season of the different prey in the diet of White-browed Blackbirds (*Sturnella superciliaris*) in the Buenos Aires Province, Argentina.

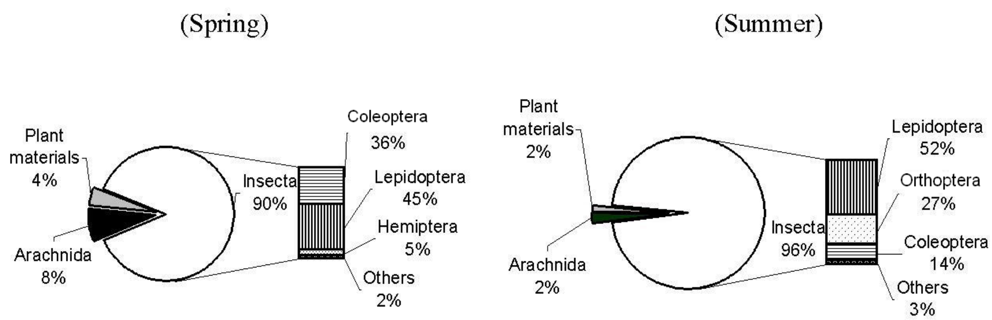

FIG. 2. Volume percent for each season of the different prey in the diet of White-browed Blackbird (*Sturnella superciliaris*) in the Buenos Aires Province, Argentina.

Frequency of occurrence, importance by number and reconstituted volume of the total of stomachs analyzed, grouped by categories, are shown in Table 1.

Insects were the main prey in terms of volume throughout the sampling period. Although plant materials occurred in 21 samples, they represented less than 3% of the total food volume (Table 1).

Trophic spectrum. Based on the identification of 41 item prey (Table 2), 73% of the trophic spectrum corresponded to animal materials, and 27% to plant materials. Within the first one, 87% (26 items) of the prey were insects and 13% (4 items) were Arachnida. The plant material fraction consisted totally of seeds, and more than 50% of them were split or broken. Seeds belonged to Monocotiledoneae (81.2%: 9 items) and Dicotiledoneae (18.8%: 2 items).

Within Insecta, Lepidoptera, Coleoptera, Orthoptera, Hemiptera and Homoptera, in decreasing importance, were the main groups contributing to the diet biomass, throughout the whole sampling period. Mantodea, Plecoptera and Diptera were registered occasionally, and were poorly represented. Araneida was the only order represented within Arachnida. *Panicum* sp. and *Stipa* sp. seeds (Order Cyperales) were the most abundant items of the plant materials fraction.

Animal prey ranged between 2.5 and 40 mm in length, and 1.5 and 8 mm in width.

TABLE 3. Absolute and percent RII values for the two seasons considered.

	Spring		Summer	
	Absolute	%	Absolute	%
INSECTA	11020.0	73.0	15864	84.8
Coleoptera	7427.5	49.2	3188.7	17.0
Lepidoptera	3184.8	21.1	7122.9	38.1
Orthoptera	55.1	0.4	5393.8	28.8
Other Insecta	352.6	2.3	158.6	0.9
ARACHNIDA	290.0	2.0	32.8	0.2
PLANT MATERIALS	3782.0	25.0	2816	15.0

Plant items varied between 1 and 5 mm in length, and 0.5 and 2 mm in width.

The dietary contribution in terms of number and volumetric percentages for each season is showed in Figures 1 and 2. Insecta constituted the bulk of the diet in both seasons. Seeds were more consumed in spring than in summer (75% vs 37% in number, respectively) but represented a minor portion of the volume during both seasons.

We did not find significant differences between seasons when comparing total number and total volume of each prey species consumed (Mann Whitney *U*-test, $U = 3$, $P = 0.5126$ and $U = 4.5$, $P = 1.000$, respectively).

Although we found that the mean number of prey items per stomach during spring (49.5) was higher than in summer (16.9), the mean volume per stomach was similar in both seasons (2.2 cm^3 and 1.7 cm^3, respectively), without significant differences in both cases (Mann Whitney *U*-test, $U = 92.5$, $P = 0.082$; $U = 105.0$, $P = 0.19$, respectively).

The RII confirmed a strong predominance of Insecta for both seasons, which counted for 73% of the diet in spring, and almost 85% in summer (Table 3).

The standardized–niche breadth value was wider in summer (FNBst = 0.3289) than in spring (FNBst = 0.0670). Shannon and Weaver Index (H) showed the following values: 0.771 for spring and 1.117 for summer, indicating that during summer the diet composition is more diverse. Both aspects agree with the higher values of uniformity found during this period (summer: 0.627 vs spring: 0.4172).

DISCUSSION

This is the first detailed quantitative study of the diet composition of the White-browed Blackbird, thus it is not possible to make any comparison with previous analyses. Notwithstanding, qualitative comparisons of our results to those obtained by Camperi (1984) agreed in that Araneida (Salticidae), Coleoptera (Curculionidae, Carabidae and Dynastidae), Lepidoptera, and Monocotiledoneae constituted the dominant groups in the diet of this species.

Preliminary comparison with the diet of the Brown-and-yellow Marshbird in the same region (Darrieu *et al.* 1996), suggests that these species have similar trophic spectra. Insecta are also the major component of their diet, followed by Arachnida and plant materials, although the Brown-and-yellow Marshbird ingests a wider variety of preys (71 item categories found), with Arachnida contributing to its volume more during spring, and seeds more during summer. Further detailed comparative analyses between the diet of these species at the same study area are in preparation.

White-browed Blackbirds showed great fidelity to tall and dense grasslands, natural or cultivated, with a medium percentage of humidity (pers. observ). They were insectivorous (in a wide sense), but also consumed seeds. Prey size was limited by the maximum width (< 8 mm) between the upper and lower mandibles (obtained at commissural level).

Our results indicate that there were no significant differences in the diet composition between spring and summer. Further studies should consider the possibility of covering autumn and winter, in order to evaluate annual variations. Notwithstanding, during spring, White-browed Blackbirds consumed more seeds, increasing the mean number of items per stomach, and reducing the diversity of the diet (mainly because of lower uniformity). Higher diversity values in the diet during summer correlate with wider niche breadth, the insects being the most important and largest prey consumed, e.g., Lepidoptera (Geometridae and Noctudidae) and Coleoptera (Dynastidae).

ACKNOWLEDGMENTS

We are grateful for the collaboration of Ing. Ana María Arambarri for the identification of plant materials and Dra. Alda González for the identification of Arachnids. G. E. Soave participated in this study as member of the Comisión de Investigaciones Científicas de la provincia de Buenos Aires (CIC).

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