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Seasonal variation in foraging behavior of *Cypsnagra hirundinacea* in the campo-cerrado

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RESUMO. **Variação sazonal do comportamento de procura de alimento em *Cypsnagra hirundinacea* em campo-cerrado.** Em campo-cerrado (Brotas-SP) estudei por cinco meses (junho a outubro de 1996) o comportamento de procura de alimento em *C. hirundinacea*. Grupos da espécie contendo de dois a oito indivíduos foram observados em média por 90 minutos. Admite-se que *C. hirundinacea* é principalmente insetívora, e coleta suas presas em meio a folhagem de arbustos e árvores. Neste estudo verifiquei que os principais substratos utilizados por esta espécie são: folhas verdes, casca de troncos e ramos, flores e o ar. Folhas mortas e o solo foram pouco utilizados. Com o avanço da estação seca *C. hirundinacea* utiliza progressivamente mais a casca, que se torna o principal substrato no pico da estação. Com o reinício das chuvas e recuperação da vegetação, as folhas verdes voltam a ser o substrato mais explorado. Procurando alimento, *C. hirundinacea* captura ou tenta capturar presas, principalmente coletando-as dos substratos estando empoleirada. Vôo foi uma tática pouco empregada. *Cypsnagra hirundinacea* revelou uma forma acrobática e minuciosa de procurar alimento, vasculhando um arbusto ou árvore intensamente antes de se deslocar para outro. Foi confirmada uma dieta principalmente insetívora. A substituição do uso das folhas pela casca das árvores, coloca-se como uma adaptação que permite suportar o rigor do pico da estação seca, quando a maioria das árvores e arbustos estão sem folhas.
PALAVRAS-CHAVE: *Cypsnagra hirundinacea*, cerrado, procura de alimento, traupídeo, substrato alimentar.
KEY WORDS: *Cypsnagra hirundinacea*, cerrado, foraging, foraging substrate, tanager.

Tanagers (Emberizidae: Thrapinae) are among the most widespread birds of the neotropics. Only five species, however, inhabit the dry, open habitats of central Brazil. One of these, the White-rumped Tanager (*Cypsnagra hirundinacea*), is fairly common in Brazilian savannas (campo-cerrado), living in groups of two to six birds,

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usually gleaning in foliage and among branches of scattered trees and bushes, only occasionally dropping to the ground (Sick 1985, Isler and Isler 1987, Ridgley and Tudor 1989). Contrary to most tanagers, whose diet is composed of fruits and arthropods, *C. hirundinacea* is thought to be mainly insectivorous (*op. cit.*).

The cerrados are intensely seasonal habitats. Little rain falls during April to September, and many trees drop their leaves as a result (Eiten 1994). Thus, foraging substrates vary seasonally for *C. hirundinacea*. In this study, seasonal shifts in the foraging behavior of *C. hirundinacea* were quantified.

STUDY SITE AND METHODS

I studied the foraging behavior of *Cypsnagra hirundinacea* from June to October of 1996, in a campo-cerrado in Brotas (São Paulo State, 22°11'S, 47°54'W, altitude 750 m). The site area is aproximately 1,500 ha, and the vegetation consists of bushes and small trees (heights ± 2-6 m), interspersed with grassy open areas. Mean annual temperature is 19,7°C and mean annual rainfall around 1430 mm. There is a wet-hot season extending from October to March and a dry-cold season from April to September, when temperature often drops below 2°C and frosts may occur. Then, a large number of trees and bushes simultaneously drop their leaves. To found birds I randomly walked 11.5 Km of trails in the cerrado. I watched *C. hirundinacea* through 8 x 30 mm binoculars, and dictated observations in a portable recorder for later transcription. Observations were developed from 07:00 to 11:30 and from 13:00 to 17:30. When a group (two to eight birds) of *C. hirundinacea* was found, I waited 5-10 min to allow the birds to become habituated. Then, I followed a bird up to the first capture or attempt to capture a prey. After this I switched to another bird, and so on. *Cypsnagra hirundinacea* groups were followed on average for 90 min. Foraging behavior was quantified using three foraging parameters: (a) foraging height (to nearest m), (b) prey substrate and (c) foraging movement. Prey substrate, the substrate from which a prey item was extracted, were: green leaves, bark (of trunk and branches), flowers, air and other (dead leaves, ground and grass stems). Foraging maneuver was the action taken to capture or attempt to capture prey. The maneuvers included were: (a) sally a flight to capture a flying insect; (b) hover a flight during which a prey was gleaned from a prey substrate (excluding the air); (c) glean and (d) probe, which consists of many beak actions toward a substrate where a prey was hidden (such as in crevices). *Cypsnagra hirundinacea* acrobatically searches for prey, therefore, I distinguished between two foraging positions: back upward or downward.

RESULTS AND DISCUSSION

In the five months of observations, I recorded 301 feeding bouts. The most frequently used substrates were green leaves and bark (39 and 34% of the feeding bouts respectively, figure 1). As noted elsewhere (Sick 1985, Isler and Isler 1987 and Ridgely and Tudor 1989), arthropods constituted the bulk of *C. hirundinacea* diet, especially caterpillars (table 1), most of which were gleaned in bushes and small trees. From June to September, as the dry season progressed and most trees and bushes drop their leaves, bark became the mainly exploited substrate (figure 1). In October, with the first rainfall, the vegetation recovered and green leaves were the most frequently used substrate.

Some tanagers extensively consume flowers, but until this study *C. hirundinacea* was not known to be among this group (*op. cit.*). In the months of July and August, the small flowers of the tree *Pouteria torta* were regularly consumed by these birds, from which petals, nectar and pollen were obtained (figure 1). Alves (1991) found flowers in the diet of another cerrado tanager, *Neothraupis fasciata*, that feeds mainly on fruits and seeds, in the dry season. Rodrigues (1995) also found a major role of fruits in the diet of some Atlantic Forest tanagers. In this study, however, *C. hirundinacea* was not observed to feed on fruits, although this may be possible in other months of the year.

In all substrates, except air, gleaning was the most frequently employed foraging maneuver (figure 2), although in bark and others, probing was also employed regulary, as birds extracted prey from crevices. Sally was a rarely used maneuver, being conspicuous only in September and October (figure 1), when they chased flying ants and termites that emerged during the wet season. Alves (1991) found that the air was the least used substrate by *N. fasciata*. Instead, this species foraged mainly on the ground or close to it. Rodrigues (1995) found that *Trichothraupis melanops* used air as the principal substrate among 13 tanagers.

Table 1. Prey captured by foraging *Cypsnagra hirundinacea*.

Prey size (cm)	N	Prey type	N
< 1	13	caterpillars	22
1 - 2	24	larvae	14
2 - 4	5	orthopterans	5
4 - 6	4	coleopterans	4
> 6	2	spiders	3

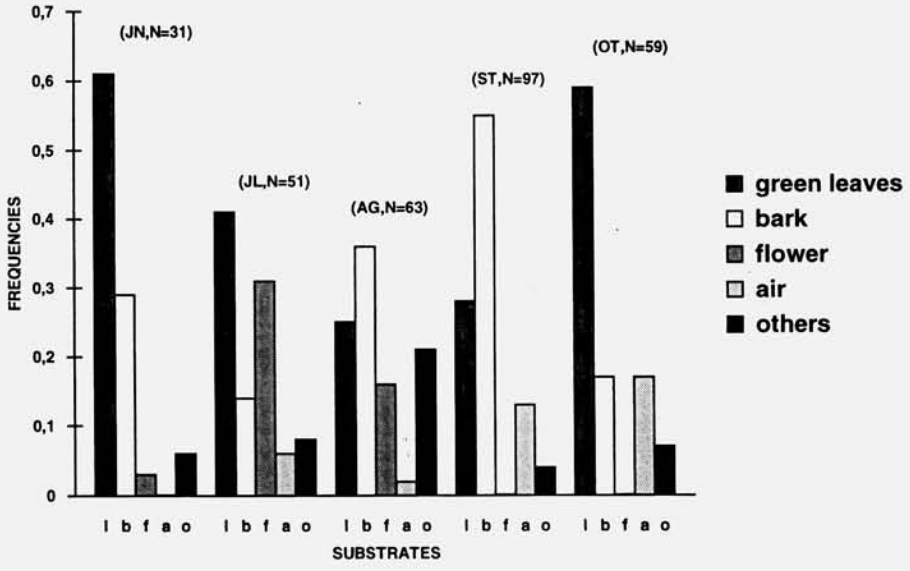

Figure 1. Monthly variation in substrates used by foraging *Cypsnagra hirundinacea*. Sample size of each month in brackets. JN- June, JL- July, AG- August, ST- September, OT- October.

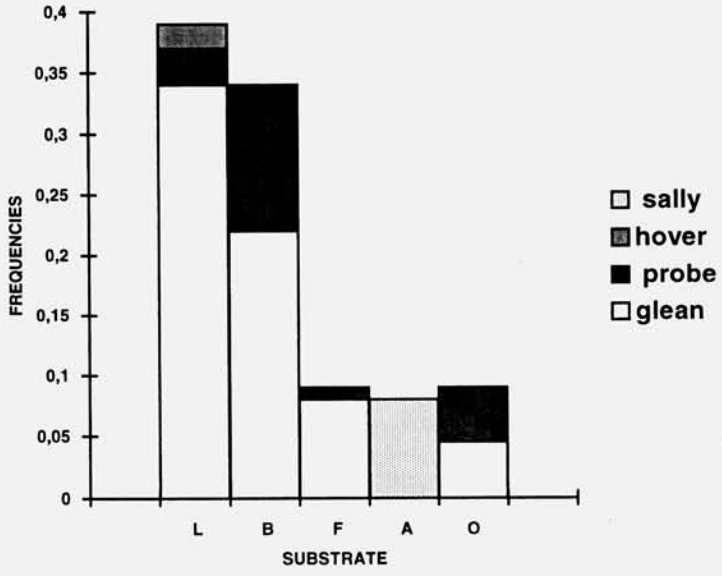

Figure 2. Substrates and the frequencies of foraging maneuvers employed by *Cypsnagra hirundinacea* (N = 301 feeding bouts). L- green leaves, B- bark, F- flowers, A- air, O- others.

The heights used for foraging by *C. hirundinacea* are illustrated in figure 3. Because most foraging was in bushes and small trees, the majority of observations were from 0.5 to 3.5 m. The green leaves and bark were exploited almost at the same frequencies in these heights. When foraging in bark *C. hirundinacea* used a wide range (0.5-15 cm in diameter, N=103) of trunks and branches.

Cypsnagra hirundinacea foraged acrobatically, conducting a very close inspection of leaves and bark crevices, often craning the neck, turning upside down. They generally made slow, continuous progress while weaving thorough the branches of a tree, and often spent considerable time searching a single tree (Isler and Isler 1987, pers. obs.). In 22 % of the cases, birds searched with

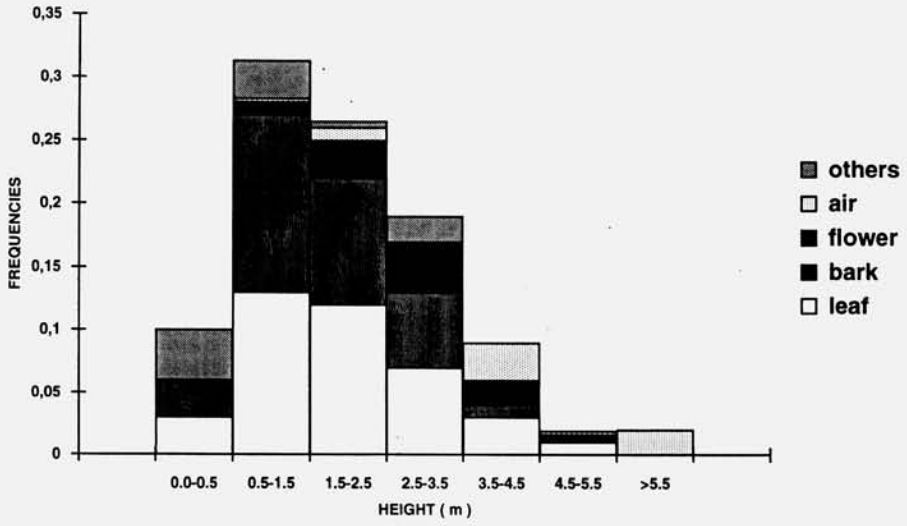

Figure 3. Heights and the frequencies of substrates used by foraging *Cypsnagra hirundinacea* (N = 301 feeding bouts).

the back downward. This foraging tatic was used more (32 %, N=111) by birds gleaning in green leaves at the tip of branches [66 % of gleans on the underside of leaves (N=47) were with the back down]. This foraging pattern strongly resembles that of *Campylorhynchus nuchalis* on the llanos of Venezuela (Rabenold and Christensen 1979). Also, the vocal pattern of a *C. hirundinacea* pair has an overall effect that is rather like that of the *Campylorhynchus* wrens (Ridgely and Tudor 1989). This foraging method reinforced the resemblances between these two semi-open country species.

To conclude, *C. hirundinacea* foraging behavior reveals many apparent adaptations to the strongly seasonal campo-cerrado habitat. During the dry season and beginning of wet season, the preponderance of searching for arthropods was clear, although flowers in a limited period were an important food item. Few other tanagers use bark as often as *C. hirundinacea* (Snow and Snow 1971). In this respect, the foraging adaptations of *C. hirundinacea* resemble those of Paridae in temperate deciduous forests in which insects are only available on bark during the harsh winters (Morse 1970).

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REFERENCES

Alves, M. A. S. (1991) Dieta e táticas de forrageamento de *Neothraupis fasciata* em cerrado do Distrito Federal (Passeriformes: Emberizidae). *Ararajuba* 2:25-29.

Eiten, G. (1994) Vegetação do cerrado. p. 17-73. *In*: M. N. Pinto (ed.), *Cerrado: caracterização, ocupação e perspectivas*,2° ed. Brasília: Ed. Univ. Brasília.

Isler, M. L. and P. R. Isler (1987) *The Tanagers: Natural History, Distribution and Identification.* Washington, D.C.: Smith. Inst. Press.

Morse, D. H (1970) Ecological Aspects of some mixed-species foraging flocks of birds. *Ecol. Monogr.* 40:119-168.

Rabenold, K. N. and C. R. Christensen (1979) Effects of aggregation on feeding and survival in a communal wren. *Behav. Ecol. Sociobiol.* 6:39-44.

Ridgely, R. S. and G. Tudor (1989) *The Birds of South America.* v. I. *The Oscine Passerines.* Austin: Univ. Texas Press.

Rodrigues, M. (1995) Spatial distribution and food utilization among tanagers in southeastern Brazil (Passeriformes: Emberizidae). *Ararajuba* 3:27-32.

Sick, H. (1985) *Ornitologia brasileira, uma introdução.* v. II. Brasília: Ed. Univ. Brasília.

Snow, B. K. and D. W. Snow (1971) The feeding ecology of tanagers and honeycreepers in Trinidad. *Auk* 88: 291-322.