Feeding habits of the crab-eating fox, *Cerdocyon thous* (Carnivora: Canidae), in a mosaic area with native and exotic vegetation in Southern Brazil

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ABSTRACT. *Cerdocyon thous* (Linnaeus, 1766) is the most widespread neotropical canid, most commonly inhabiting forested areas. This animal is a generalist omnivore that is able to use environments disturbed by human activities. The aim of this study was to describe its diet through the stomach content analysis of 30 samples obtained from specimens that were run over in a mosaic composed by Araucaria Pine Forest, Semidecidual Seasonal Forest, natural grasslands, and exotic vegetation. The items were quantified by frequency of occurrence (F.O.) and percentage of occurrence (P.O.). A total of 64 food items were found among 171 occurrences. According to F.O. method, plant items corresponded to 93.3% of the occurrences, followed by animal items (86.7%) and human rejects (16.6%). Among plants, fruits accounted for 92.9% of the occurrences, followed by leaves (53.6%) and flowers (10.7%). *Syagrus romanzoffianum* (Cham.) Glassman, 1968 and the exotic *Hovenia dulcis* Thunberg were the most consumed fruits (30% each), and the most consumed leaves were Poaceae. Among preyed animals, the F.O. was 73.3% for invertebrates (mostly Orthoptera and Coleoptera, 36.7% each) and 63.3% for vertebrates (mostly mammals, 33.3%). Regarding the P.O. method, there was an overestimation of invertebrates (98.1%) due to the presence of ants and termites in the stomach of a single individual. In general, *C. thous* presented its usual diet. Its generalistic feeding habits can positively influence its survival in altered environments. This study also compares different methods for dietary analysis and discusses some opportunistic behaviors of *C. thous*, such as the consumption of exotic species and the use of silviculture areas as hunting sites.
KEY WORDS. Carnivorous; diet; exotic species; frugivory; neotropical canid; silviculture.

RESUMO. **Hábito alimentar do cachorro-do-mato, *Cerdocyon thous* (Carnivora: Canidae), em área de mosaico de vegetação nativa e exótica no Sul do Brasil.** *Cerdocyon thous* (Linnaeus, 1766) é o canídeo neotropical mais amplamente distribuído e habita principalmente ambientes florestados. Este animal possui hábito alimentar onívoro generalista e demonstra capacidade de utilizar ambientes perturbados pela ação do homem. O objetivo deste trabalho foi descrever sua dieta através da análise de 30 conteúdos estomacais de espécimes atropelados, provenientes de um mosaico constituído por Floresta Ombrófila Mista, Floresta Estacional Semidecidual, Campos Naturais e vegetação exótica. Os itens foram quantificados em freqüência de ocorrência (F.O.) e porcentagem de ocorrência (P.O.). No total foram identificados 64 itens, distribuídos em 171 ocorrências. De acordo com o método F.O., itens vegetais ocorreram em 93,3% das amostras, itens animais em 86,7% e rejeitos humanos em 16.6%. Entre os vegetais, os frutos apresentaram a maior F.O. (92,9%), seguido das folhas (53,6%) e flores (10,7%). *Syagrus romanzoffianum* (Cham.) Glassman, 1968 e a espécie exótica *Hovenia dulcis* Thunberg se destacaram entre os frutos consumidos (30% cada), e Poaceae entre as folhas consumidas. Dentre os animais, 73,3% foram invertebrados, com destaque para Orthoptera e Coleoptera (36,7% cada), e 63,3% foram vertebrados, destacando-se os mamíferos (33,3%). Em relação ao método P.O. houve a supervalorização de invertebrados (98,1%) devido ao consumo de formigas e cupins observado no estômago de um indivíduo. Em geral, *C. thous* apresentou uma dieta conforme o esperado. Seus hábitos alimentares generalistas podem influenciar positivamente sua sobrevivência em ambientes alterados. Este trabalho ainda compara diferentes métodos de análises da dieta e discute alguns comportamentos oportunistas de *C. thous*, como o consumo de espécies exóticas e o uso do ambiente de silvicultura para a caça.
PALAVRAS-CHAVE. Canídeo neotropical; carnívoros; dieta; espécie exótica; frugivoria; graxaim; silvicultura.

Extant neotropical canids are the independent outcome of at least three lineages, and therefore do not represent a monophyletic group (Xiaoming *et al*. 2004). However, in contrast to species from North America and the Old World, most South American canids (except *Speothos* Lund, 1842) developed a hypocarnivorous habit (Xiaoming *et al*. 2004), in which specialized carnivory was replaced by the omnivorous habit in the Neotropics (e.g. *Atelocynus* Cabrera, 1940, *Lycalopex* Burmeister, 1854, *Chrysocyon* Smith, 1839, and *Cerdocyon* Hamilton Smith, 1839).

Cerdocyon originated in North America (Xiaoming *et al*. 2004) and is currently considered monotypic. Its single representative is the South American *Cerdocyon thous*. The crab-eating fox, *C. thous*, is a medium-sized animal weighing between 3.7 and 11 kg (Langguth 1979, Rocha *et al*. 2004) and presenting the most widespread geographical distribution among neotropical canids. It occurs in Colombia, Venezuela, French Guiana, Guyana, Suriname, Brazil, Bolivia, Paraguay, northern Argentina, and Uruguay (Berta 1982, Courtnay & Maffei 2004, Maffei & Taber 2003). In Brazil, this species can be found in the Cerrado, Pantanal, Caatinga, Atlantic Rainforest, grasslands, and in some localities in Amazonia (Courtnay & Maffei 2004).

Cerdocyon thous presents, as basic social units, solitary animals, a monogamic couple or even families of up to five individuals. When foraging in pairs, it is common and occasionally cooperative (Montgomery & Lubin 1978, Courtnay & Maffei 2004, Rocha *et al*. 2004). The species is considered generalist, frequently eating fruits, insects, crustaceans, eggs, small vertebrates, carcasses, and human rejects (Montgomery & Lubin 1978, Brady 1979, Bisbal & Ojasti 1980, Facure & Giaretta 1996, Facure & Monteiro-Filho 1996, Delgado 2002, Juarez & Marinho-Filho 2002, Bueno & Motta-Junior 2004, Jácomo *et al*. 2004, Rocha *et al*. 2004, Gatti *et al*. 2006, Pedó *et al*. 2006). Therefore, *C. thous* may be regarded as an opportunistic omnivorous that performs a fairly versatile role in the environments where it occurs.

This study describes, qualitatively and quantitatively, the diet of *C. thous* with the analysis of the stomach content of specimens which were run over in a mosaic area composed by Araucaria Pine Forest, Semidecidual Seasonal Forest, grasslands, and silviculture with native and exotic vegetation.

MATERIAL AND METHODS

Study area

The analyzed stomachs were taken from specimens from "Fazenda Monte-Alegre" (a local farm; 24º12'42"S, 50º33'26"W), property of "Klabin Papel e Celulose S.A.", located in the middle stretches of Tibagi River basin, in the municipality of Telêmaco Borba, state of Paraná, Southern Brazil. This area has approximately 127.000 ha, from which 52.000 ha is of native vegetation composed by three distinct formations: Araucaria Pine Forest, Semidecidual Seasonal Forest and natural grasslands. The remaining area is formed by silvicultural exotic species such as *Pinus* spp., and *Eucalyptus* spp. and native ones such as *Araucaria angustifolia* (Bertol.) Kuntze (Reis *et al*. 2005). The study area has average altitude of 885 m and the climate is mesothermic, humid subtropical, without a well-defined dry season, with the average temperature in the warmest month of 22ºC and annual rainfall between 1300 and 1400 mm (Nakajima *et al*. 1996). This region has already been a target for floristic composition and phytosociology studies in riparian areas (Nakajima *et al*. 1996), and for mammal surveys (Reis *et al*. 2002, 2005). In Fazenda Monte-Alegre *C. thous* is syntopic with *Lycalopex vetulus* (Lund, 1842), *L. gymnocercus* (G. Fischer, 1814), *Chrysocyon brachyurus* (Illiger, 1815), *Procyon cancrivorus* (G. Cuvier, 1798), *Nasua nasua* (Linnaeus, 1766), *Eira Barbara* (Linnaeus, 1758), *Galictis cuja* (Molina, 1782), *Leopardus pardalis* (Linnaeus, 1758), *L. tigrinus* (Schreber, 1775), *L. wiedii* (Schinz, 1821) and *Puma yaguarondi* (Lacépède, 1809) (Reis *et al*. 2005) – carnivore species that may have similar diet habits to *C. thous* (Bisbal & Ojasti 1980, Juarez & Marinho-Filho 2002, Jácomo *et al*. 2004, Gatti *et al*. 2006).

Methods

A total of 30 stomach content samples were taken from run over adult specimens in a stretch of the road PR-160, through "Fazenda Monte-Alegre", from January, 2001 to May, 2006. Among them there were 19 males and 11 females. The contents of each stomach were weighted and placed in 1000 ml test tubes with water to measure their volume (see Bisbal & Ojasti 1980). Afterwards, food items were sorted and identified to the lowest taxonomic category possible using a dissecting microscope.

The identification of plant items were made by comparison with reference material deposited in the scientific collection of the herbarium of the Universidade Federal do Paraná (UFPR) in Curitiba and also referring to Nakajima *et al*. (1996) and Lorenzi (2002). Animal items were identified using identification keys and also compared to reference collections of the following institutions in Curitiba: invertebrates at Departamento de Zoologia of UFPR and identification-key for insect orders (Buzzi 2002); vertebrates at Museu de Zoologia of Pontifícia Universidade Católica do Paraná (MZ.PUCPR), Museu de História Natural do Capão da Imbuia (MHNCI, Municipality of Curitiba, Paraná) and the Mammalian Collection of Departamento de Zoologia of the Universidade Federal do Paraná (DZUP).

Items were quantified according to their frequency of occurrence (F.O.). In this case, the presence of a certain item in a stomach was considered an occurrence, despite the number of individuals containing in the sample. For the animal items was also possible to quantify the percentage of occurrence (P.O.) by counting all occurrences of an item to estimate the minimal number of preyed individuals (Emmons 1987, Konecny 1989, Wang 2002).

RESULTS

The stomach contents averaged 0.11 kg ± 0.07 in mass and 0.12 l ± 0.10 in volume. Females had an average of 0.094 kg of content per stomach, whereas males had 0.104 kg. A total of 64 food items was found distributed among 171 occur-

rences. Tables I and II show the items and the occurrences except for those from human rejects (one item and five occurrences). According to F.O. method, plant items corresponded to 93.3%, animal items to 86.7%, and human rejects (rice, bean, collared green, pork and beef) to 16.6%.

Eleven species of plants were identified among four genera and 13 families. In the case of plants, fruits accounted for 92.9%, leaves for 53.6% and flowers for 10.7% (n = 28). Fruits of *Syagrus romanzoffianum* (Cham.) Glassman, 1968 and *Hovenia dulcis* Thunberg were the most eaten items among encountered plants (30% each). Besides *H. dulcis*, exotic species also identified were *Musa paradisiaca* L., *Diospyrus kaki* L. f., *Persea americana* Mill. and *Pinus* spp. (10.7%). All leaves found in the analyzed stomachs [Poaceae, Magnoliopsida and *Pinus* spp.] were found together with an animal prey.

Among animal items, 12 species, eight genera and 19 families were identified. Except for *Sphiggurus villosus* (F. Cuvier, 1823) (4 kg to 5 kg), all other prey were small-sized animals (< 1 kg). The F.O. was 73.3% for invertebrates and 63.3% for vertebrates. Among invertebrates, Orthoptera and Coleoptera were the most common (F.O. 36.7% each). Evaluating vertebrates through F.O. method, mammals were found in 33.3% of the samples, reptiles and amphibians in 16.7% each, and birds in 13.3%. According to P.O. method, Cricetidae represented 86.7% of consumed mammals. The percentage of occurrence (P.O.) registered 98.4% for the consumption of invertebrates and 1.6% of vertebrates (n = 2316). This method overestimated the relative importance of invertebrates such as *Camponotus* sp. (78.5%) and the Termitidae (13.9%), which were present in numerous individuals (n = 2144) exclusively in one single stomach.

DISCUSSION

The diet of *C. thous* has been quantified through different methods (e.g. direct observation, feces analysis and stomach content analysis) that report similar food items but in varying proportions (Bueno & Motta-Junior 2004). Nevertheless, direct observation may hinder the identification of consumed items and feces analysis may emphasize solely items of hard tissues, which may not be digested (Rocha *et al*. 2004, Uchoa & Mauro-Brito 2004). The opportunistic analysis of stomach contents taken from run over animals can reveal a higher diversity in the whole set of items consumed by mesocarnivores, as it allows the analysis and the quantification of soft-tissue items. In this work soft-tissue items were registered (e.g. gastropods, oligochaetes, insect larvae, vertebrate skin, fruit pulp, leaves, flowers and rejected human food), which would be very difficult to be noticed by feces analysis. The stomach content analysis may present limitations as a quantitative method (Bisbal & Ostaji 1980), yet it extends the knowledge about the feeding repertory of a given animal. The advantage of such material coming from run over specimens should be recommended as a supplementary tool. In addition, for abundant and frequently run over animals, this method allows a systematic survey and provides basic information while no solutions for the reduction of vehicle accidents with wild animals are determined.

In this study, *C. thous* presented an omnivorous diet with the consumption of plant and animal material in similar frequencies (according to F.O.), ensuring the ingestion of carbohydrates and proteins. Fruits were the plant items of major occurrence, mainly *S. romanzoffiana* e *H. dulcis*. These fruits were also very frequent in the diet of *C. thous* in a Semidecidual Seasonal Forest (Rocha *et al*. 2004), close to the study area of

Table I. Frequency of occurrence (F.O.) of identified Plantae taxa, discriminating parts and items found in stomachs of *Cerdocyon thous*.

Plants	Found item	F.O	
		N	%
Cecropiaceae			
Cecropia pachystachya	Fruit	2	6.7
Arecaceae			
Syagrus romanzofianum	Fruit	9	30.0
Lauraceae			
Nectandra grandiflora	Fruit	1	3.3
Nectandra rigida	Fruit	1	3.3
Persea americana	Fruit	2	6.7
Lauraceae N.I.	Fruit	1	3.3
Rhamnaceae			
Hovenia dulcis	Fruit	9	30.0
Myrtaceae			
Psidium guajava	Fruit	1	3.3
Psidium spp.	Fruit	3	10.0
Myrtaceae N.I.	Fruit	1	3.3
Cucurbitaceae			
Cucurbita sp.	Fruit	2	6.7
Solanaceae			
Solanum granulosoleprosum	Fruit	1	3.3
Solanum sp.	Fruit	1	3.3
Moraceae			
Ficus sp.	Fruit	1	3.3
Piperaceae			
Piper aduncum	Fruit	3	10.0
Ebenaceae			
Diospyrus kaki	Fruit	1	3.3
Musaceae			
Musa paradisiaca	Fruit	2	6.7
Leguminosae			
Leguminosae N.I.	Fruits, flowers, leaves	19	63.3
Poaceae			
Poacae N.I.	Fruits, leaves	15	50.0
Subtotal, Plants		75	–

Table II. Frequency of occurrence (F.O.) and percentage of occurrence (P.O.) of identified Animalia taxa, discriminating parts and items found in stomachs of *Cerdocyon thous*.

Animals	Found item	F.O.		P.O.	
		N	%	N	%
Nematoda N.I.	entire animal	1	3.3	1	0.04
Annelida					
Clitellata N.I.	entire animal	3	10.0	7	0.30
Mollusca					
Gastropoda N.I.	entire animal	3	10.0	8	0.30
Arthropoda					
Odonata					
Coenagrionidae	wings	1	3.3	1	0.04
Orthoptera					
Tettigonidae	Legs, wings, tagma	1	3.3	2	0.09
Gryllidae	legs, tagma	3	10.0	4	0.20
Gryllotalpidae	wings, legs, tagma	1	3.3	1	0.04
Orthoptera N.I.	legs, wings	6	6.7	8	0.30
Mantodea N.I.	entire animal, legs, wings	3	10.0	3	0.09
Homoptera N.I.	wings	1	3.3	1	0.04
Coleoptera					
Cerambycidae (*Ctenoscelis* sp.)	entire animal, legs, antennae, eggs	4	13.3	14	0.60
Coleoptera N.I.	larvae, elytron, abdomen, appendices	7	23.3	10	0.40
Diptera N.I.	entire larvae	3	10.0	30	1.30
Lepidoptera N.I.	entire larvae	4	13.3	5	0.20
Hymenoptera					
Formicidae (*Camponotus* spp.)	eggs, larvae and entire adults	1	3.3	1822	78.50
Formicidae N.I.	entire adults	6	6.7	33	1.40
Isoptera					
Termitidae	entire adults	1	3.3	322	13.90
Insecta N.I.	larvae, wings, legs, tagma	6	6.7	7	0.30
Subtotal Invertebrates			55.0	–	2279.00
Vertebrata N.I.	egg shell	1	3.3	1	0.04
Amphibia					
Anura N.I.	skin, bones	1	3.3	1	0.04
Bufonidae					
Chaunus henseli (Lutz, 1934),	entire animal	1	3.3	1	0.04
Chaunus sp.	skin, limbs	2	6.7	2	0.09
Leptodactylidae (*Leptodactylus* sp.)	skin, limbs	1	3.3	1	0.04
Reptilia					
Squamata N.I.	skin, limbs	1	3.3	1	0.04
Leiosauridae					
Anisolepis grilli Boulenger,1891	entire animal	1	3.3	2	0.09
Enyalius perditus Jackson, 1978	entire animal	1	3.3	1	0.04
Gymnophtalmidae					
Cercossaura schreibersii (Wiegmann, 1834)	skin, limbs, bones	1	3.3	1	0.04
Colubridae					
Liophis poecilogyrus (Wied-Neuwied, 1825)	entire animal	1	3.3	1	0.04

Continue

Table II. Continued.

Animals	Found item	F.O.		P.O.	
		N	%	N	%
Colubridae N.I. 1	scales	1	3.3	1	0.04
Colubridae N.I. 2	scales	1	3.3	1	0.04
Viperidae (*Bothrops* sp.)	scales	1	3.3	1	0.04
Aves					
Tinamidae: *Nothura maculosa* (Temminck, 1815)	feathers	1	3.3	1	0.04
Picidae: *Colaptes campestris* (Vieillot, 1818)	feathers	1	3.3	1	0.04
Rhinocryptidae (*Scytalopus* sp.)	feathers	1	3.3	1	0.04
Columbidae (*Leptotila* sp.)	feathers, tarsi, foot, nails	1	3.3	1	0.04
Passeriformes N.I.	feathers	1	3.3	1	0.04
Aves N.I.	feathers	2	6.7	2	0.09
Mammalia					
Rodentia					
Cricetidae					
Brucepattersonius iheringi (Thomas, 1896)	entire animal	1	3.3	1	0.04
Bolomys lasiurus (Lund, 1841)	head, legs, tail	1	3.3	1	0.04
Thaptomys nigrita (Lichtenstein, 1829)	entire animal, rear part	2	6.7	2	0.09
Akodon sp. Meyen, 1833	entire animal	2	6.7	2	0.09
Cricetidae N.I.	entire animal, legs, tail, vertebrae	7	23.3	7	0.30
Cavidae					
Cavia aperea (Erxleben, 1777)	tooth, fur	1	3.3	1	0.04
Erethizontidae					
Sphiggurus villous (F. Cuvier, 1823)	epiphyses, fur, tissues	1	3.3	1	0.04
Subtotal, Vertebrates			36.0	21.8	37.00
Total		91		2316	100.00

the present study, demonstrating the importance of the native palm tree and the opportunism for exotic species in its diet. Although fruits were most frequently found, leaves were representative, as well. Magnoliopsida and *Pinus* leaves might have been accidentally ingested together with their prey (all occurred together with animal prey). In *Pinus* plantation areas there is an accentuated deposition of leaves by the planted trees. *Cerdocyon thous* is often observed foraging in such areas, which reinforces the hypothesis of accidental ingestion. Uchoa & Moura-Britto (2004) also found *C. thous* visiting monocultures of *Pinus* spp. in Paraná's Cerrado. In this kind of monoculture some rodents, such as *Olygoryzomys nigripes* (Olfers, 1818), *Akodon montensis* Thomas, 1913, *Delomys dorsalis* (Hensel, 1872) and *Euryzygomatomys spinosus* (G. Fischer, 1814) (Gonçalvez *et al*. 2007) are present and may attract *C. thous*. The consumption of Poaceae leaves, on the other hand, may have been intentional, for its frequency was higher than other kinds of leaf. This is seemingly common among carnivores and may be intentional in order to augment digestion efficiency (Dietz 1984, Bueno & Motta-Junior 2004, Rocha *et al*. 2004).

Cerdocyon thous ate mainly small animal prey, except for *S. villosus*. Apparently, *C. thous* has limitations to capture animals of larger size (Bisbal & Ojasti 1980), which do not occur with similar sized felids [e.g. *Leopardus pardalis* (Linnaeus, 1758) (Abreu *et al*. 2008)]. This restriction may be a consequence of two main factors: 1) solitary life style or in couples. The absence of cooperative hunt does not allow the capture of prey larger than itself, as it is observed in social canids that hunt in groups [*e.g. Speothos venaticus* (Lund, 1842), *Canis lupus* Linnaeus, 1758, *C. latrans* Say, 1823, *Cuon alpinus* (Pallas, 1811) and *Lycaon pictus* Temminck, 1820 (Wallace *et al*. 2002, Nowak 1999)]. 2) The less specialized morphology of canids when compared to felids. The relative lack of specializations for predation can enhance the generalist feeding habit for small animals and plants.

Small vertebrates and invertebrates were found in similar frequencies (according to F.O.). Among invertebrates, arthropods were the most frequent, especially orthopterans and coleopterans, as already demonstrated by other authors (Motta-Junior *et al*. 1994, Facure & Monteiro-Filho 1996, Juarez & Marinho-Filho 2002, Rocha *et al*. 2004, Gatti *et al*. 2006). Mam-

mals were more frequent among vertebrates, with Cricetidae rodents being the most common. These rodents are usually the most abundant terrestrial vertebrates in neotropical forests (Solari & Rodrigues 1997). This and other studies showed that rodents are the mammals most frequently consumed by *C. thous* throughout its geographical distribution, exceeding the consumption of other vertebrate classes (Motta-Junior *et al*. 1994, Facure & Monteiro-Filho 1996, Delgado 2002, Juarez *et al*. 2002, Jácomo *et al*. 2004, Rocha *et al*. 2004, Pedó *et al*. 2006). An exception for this pattern was detected by Gatti *et al*. (2006) in a "restinga" area where reptiles were the most frequent vertebrates in its diet.

In the present study, reptiles and amphibians were the second most frequently consumed vertebrates, with special emphasis to poisonous animals, such as those belonging to *Bothrops* Wagler, 1824 and *Chaunus* Wagler, 1828. Rocha *et al*. (2004) suggested that *C. thous* may assimilate dead specimens or has any particular behavioral strategy for catching poisonous animals. The toxic prey found in the analyzed stomachs were well preserved, especially *Chaunus*, thus, suggesting they were captured alive. Experimental observations with captive and wild specimens may demonstrate such behavior and indicate whether *C. thous* is resistant to those toxins.

The birds were the least frequently consumed vertebrates and the identified items suggest that all species inhabit the lowest layer and ground of the environment, facilitating predation by *C. thous*. *Nothura maculosa* (Temminck, 1815), *Colaptes campestris* (Vieillot, 1818), *Leptotila* sp. Swainson, 1837 and *Scytalopus* sp. Gould, 1837 are birds that use the ground as their main foraging site, making them vulnerable to terrestrial carnivores. In conclusion, the consumption of vertebrates by *C. thous* appears to be defined primarily as a consequence of small size, abundance and terrestrial habit of its prey (Brady 1979).

The P.O. method overestimated the consumption of invertebrates, because one of the sampled stomachs contained only ants and Termitidae associated in large numbers. These items are not often found in the crab-eating fox diet but are commonly found on the hoary fox diet, *L. vetulus* (Courtenay *et al*. 2006). Termitidae predation by *Camponotus* Mayr, 1861 is a well known event (Hölldobler & Wilston 1990), then, the most parsimonious possibility is that, in that occasion, the given *C. thous* specimen was benefited by a possible interaction between *Camponotus* and the Termitidae (Marcio R. Pie, Departamento de Zoologia, Universidade Federal do Paraná, pers. comm.).

This study evidenced one more time the opportunistic behavior of *C. thous* with the consumption of exotic species, human rejects and also the use of silviculture areas for foraging (inferred by the presence of *Pinus* sp. leaves associated to the prey). Hence, despite the influence of exotic plantations inside the surveyed mosaic, the diet of *C. thous* is in agreement to the already known for the species (Montgomery & Lubin 1978, Brady 1979, Bisbal & Ojasti 1980, Facure & Giaretta 1996, Facure & Monteiro-Filho 1996, Delgado 2002, Juarez & Marinho-Filho 2002, Bueno & Motta-Junior 2004, Jácomo *et al*. 2004, Rocha *et al*. 2004, Gatti *et al*. 2006, Pedó *et al*. 2006), strongly suggesting that its generalist habits enables its survival in environments modified by humans.

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