Original Article

REPRODUCTIVE BIOLOGY AND TERRITORIALITY OF THE WEDGE-TAILED GRASS-FINCH (*Emberizoides herbicola*) (Aves: Passeriformes)

BIOLOGIA REPRODUTIVA E TERRITORIALIDADE DO CANÁRIO-DO-CAMPO (Emberizoides herbicola) *(Aves: Passeriformes)*

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ABSTRACT: *Emberizoides herbicola* (Wedge-tailed Grass-finch), Emberizidae, Passeriformes, lives in various types of grasslands in South America. Its life history is poorly known and here we provide novel information on several aspects of its breeding biology, including territoriality and habitat use. We investigated it at Águas Emendadas Ecological Station, Federal District, Brazil, between 2002 and 2009. Banded *E. herbicola* had an average territory size of 3.9 ha (n = 6). Twenty nests were monitored every 2–4 days, of which 18 were active. The reproductive period occurred from October to March, but eggs were laid from early October to mid-November, with a peak in late October. Nests were built close to the ground and (mean height = 14.8 ± 9.0 cm, n = 17) clutch size was invariably two but ranged from one to three eggs (mean = 2 ± 0.4, n = 15). Incubation period was 14.8 ± 0.8 days (n = 2) and nestling period was 11 ± 0.6 days (n = 4). Most nests (n = 12) were built in open *cerrado* vegetation. Among the 18 active nests, 44.4% were successful, 38.9% were depredated and 16.7% were abandoned. Predation rate during the nestling period (85.7%) was significantly higher than during the incubation period (14.3%). Mayfield nest success rate was 42%, with a much higher survival rate during the egg period (0.881 ± 0.112) than during the nestling period (0.476 ± 0.147). Most nests (n = 12) were built in open *cerrado* vegetation, which may be considered the most important habitat for the species both for territory defense and nesting.

KEYWORDS: Breeding biology. Cerrado. Life history. Territory.

INTRODUCTION

The breeding biology and nest success of most Neotropical birds remain poorly studied (STUTCHBURY; MORTON, 2001) despite the high bird diversity and increased habitat loss and threat in the region. For example, among the 132 Fluvicolinae flycatchers from the New World, 29% (n = 38 species) have no description of their breeding biology, and most (> 76%) lack any data on egg weight, incubation period, and nestling period (HEMING et al., 2013). Besides the theoretical importance of breeding biology knowledge (ex. RICKLEFS, 2000), estimates of nest success are fundamental to evaluate productivity (RICKLEFS; BLOOM, 1977) and give support to conservation and management actions and plans, such as population viability analyses (e.g. DUCA et al., 2009).

Furthermore, a thorough understanding of avian territorial behavior provides essential information to develop sound conservation planning (NEWTON, 1992). Territory size may be affected by many factors such as habitat structure, food availability and potential nesting sites (WIENS, 1973; SMITH; SHUGART, 1987), and may vary during the year (i.e., breeding season vs. non-breeding season) (MØLLER, 1990; RODRIGUES, 1998). Despite the fact that its importance has been shown by numerous intensive studies of temperate species (e.g., BYRKJEDAL et al., 1997; COLLISTER; WILSON, 2007), territory size in Neotropical birds is relatively poorly studied (STUTCHBURY; MORTON, 2001).

Emberizoides herbicola (Wedge-tailed Grass-finch), Emberizidae, Passeriformes, inhabits grasslands, tall, dry, or wet, and forages for seeds and arthropods on or near ground (HILTY; BROWN, 1986; SICK, 2001; DEL HOYO et al., 2011). The southern race *Emberizoides h. herbicola* occurs in Brazil, Bolivia, Paraguay, Uruguay and northeastern Argentina at altitudes up to 1,500 m (DEL HOYO et al., 2011), and very little is known about its life history (SICK, 2001; DI GIACOMO, 2005; RODRIGUES et al., 2009; DEL HOYO et al., 2011). Nests are open cups of dry grass lined with fine plant material, and are built in open areas of tussock grass (RODRIGUES et al., 2009). The eggs are white with brown spots concentrated at the larger end (DI GIACOMO, 2005; RODRIGUES et al., 2009). Data on the territorial behavior of *E. herbicola* are nonexistent and their reproductive biology remains poorly studied (DI GIACOMO, 2005; RODRIGUES et al., 2009). We fill gaps in knowledge of its life history, specifically about its breeding biology and territoriality.

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MATERIAL AND METHODS

We studied Wedge-tailed Grass-finch at Águas Emendadas Ecological Station (ESECAE) (15º32'50.87"S; 47º36'57.70"W), a 10,500-ha reserve in the Federal District, Brazil. The reserve is within the Cerrado biome where the climate is highly seasonal, with a rainy season from October to April and exceptionally dry winters (NIMER, 1979).

Data were collected in a 100 ha (1 km x 1 km) plot located about 1.5 km from the edge of the reserve. The study plot is divided into a grid by 23 narrow trails spaced 50 m apart on an east-west axis, forming 400 50 x 50 m squares with corners identified with markers. The plot had its vegetation types identified following Ribeiro and Walter (1998), including a gradient from open to closed vegetation: '*campo limpo*' (which is a grassland without shrubs or trees) (7.7% of plot area), '*campo sujo*' (which is a grassland with scattered shrubs and trees) (5.7%), 'park *cerrado*' (which consists of mounds of *cerrado* vegetation within a *campo sujo*) (4.0%), 'open *cerrado*' (which has few shrubs and trees < 15 m) (29.6%), '*cerrado típico*' (which is dense and shrubby with some emergent trees up to 15 m) (51.7%), and 'dense *cerrado*' (a more closed *cerrado típico* with more trees) (0.3%).

We captured birds with the use of mist nests from 2002 to 2009. Birds were weighed, measured, and marked with metallic bands provided by CEMAVE (IBAMA) and unique combinations of three plastic color bands. We defined age classes based on plumage characteristics, beak commissure, and skull ossification. Individuals estimated to be less than one year old were considered juveniles and the others classified as adults. We used the presence of incubation patches to determine sex of females.

We carried out field observations of marked individuals with the aid of binoculars (10 x 50 mm) from August 2003 to July 2004. At each encounter, we recorded an individual's location within the plot. Territories were then delineated by the convex polygon method (ODUM; KUENZLER, 1955) which consists of connecting all the extreme points of detection, creating a convex polygon of the smallest area possible (none of the internal angles exceed 180 degrees) and covering all recorded locations. Due to sexual monochromatism in this species we further confirmed the sex of banded males by following only adults which exhibited territorial behavior (singing, chasing intruders, etc.). Territories were delineated based on at least 80 records of both male and female on a given area, since fewer records generated small imprecise areas. We considered territories stable in size if they had at least 80 records of at least one individual belonging to the couple and when their area stopped growing after adding more records.

We searched for nests from August to December 2002–2009 by following birds carrying food or nest material, searching the vegetation where birds sang early in the morning, or by searching vegetation within known territories. Nests were monitored at 2–4 day intervals to assess their contents (i.e. empty, eggs, or nestlings). When eggs were near hatching (about 15 days of incubation) or nestlings near fledgling (about 11 days after hatching), we monitored nests every 1–2 days to more accurately assess dates of the hatching and fledging. We determined the reproductive period through the activity of the nests and indirect evidence of breeding gathered during banding such as brood patch.

As nest dimensions tend to change with increased use, we measured nests (height, depth, and external and internal diameter) only during the first days of incubation. We measured nest height above the ground to the nearest 1 cm using a measuring tape and the nesting substrate was identified in the field or by comparison with plants from the herbarium at Universidade de Brasília. The vegetation surrounding each nest was classified as one of the six Cerrado vegetation types (see above) within the plot (*sensu* RIBEIRO; WALTER, 1998).

We took measurements of eggs with a digital caliper (precision of 0.1 mm) and recorded mass with a 10 g spring scale (precision of 0.1 g) the day after clutch completion. To determine clutch size we considered only nests found during building or early incubation, and those which remained with the same number of eggs for at least 4–5 days. Incubation period is reported as the period from the laying of the last egg until hatching of the first nestling. We estimated the incubation period only for nests found during building or with only one egg and in which at least one egg hatched. Nestling period is reported as the period from hatching of the first nestling until fledging of the last chick (ROBINSON et al., 2000). We estimated nestling period only for nests found before the first egg hatched and which fledged at least one bird. To estimate the period in the breeding season of each nesting phase we backdated or projected each phase of each of the 20 active nests found. Estimates were projected to one of three 10-day periods of each month: I = from day 1 to 10; II = from day 11 to 20; III = from day 21 to 30 (or 31). The values of incubation period and length of stay of nestlings obtained are estimates of the average time between two visits to the nest and are not the actual values.

We considered nests to be successful if at least one chick fledged. We considered nests to have been predated if their contents disappeared before the nestlings were developed enough to leave the nest. Nests were considered abandoned if they remained empty and showed no sign of activity for seven days after completion or if they contained eggs for more than 20 days without hatching.

Nesting success was calculated both as a simple percentage of successful nests and as daily nest survival rates (DSRs) and period survival rates (PSRs) during the egg and nestling periods (MAYFIELD, 1961; 1975). Nest survival from the start of incubation to fledging was calculated as the product of the PSRs during the incubation and fledging periods (MAYFIELD, 1961; 1975). The variances of DSRs and PSRs were estimated, respectively, after Hensler and Nichols (1981) and Mason (1985). We excluded three abandoned nests in the DSR analysis because it is difficult to estimate abandonment date.

RESULTS

We marked 34 individuals of *E. herbicola*, between August 2003 and July 2004 and delimited 10 territories within the study area (Figure 1), of which only six were stable, with an average area of 3.9 ± 0.8 ha (n = 6) with little overlap among them. During the non-reproductive period, males sang less intensively, and had fewer agonistic behaviors than during the reproductive season. Nevertheless, couples remained extremely faithful to their territories even in this period. Birds were limited to specific regions of the study plot, being mainly sighted in areas of open *Cerrado* (mean ± standard error = 60.4 ± 15.2% of territories, n = 6), but also in *campo sujo* (16.6 ± 7.5%), and park *cerrado* (16.5 ± 10.5%). Few territories occurred in areas of *cerrado típico* (5.3 ± 3.8%) and *campo limpo* (1.2 ± 1.2%).

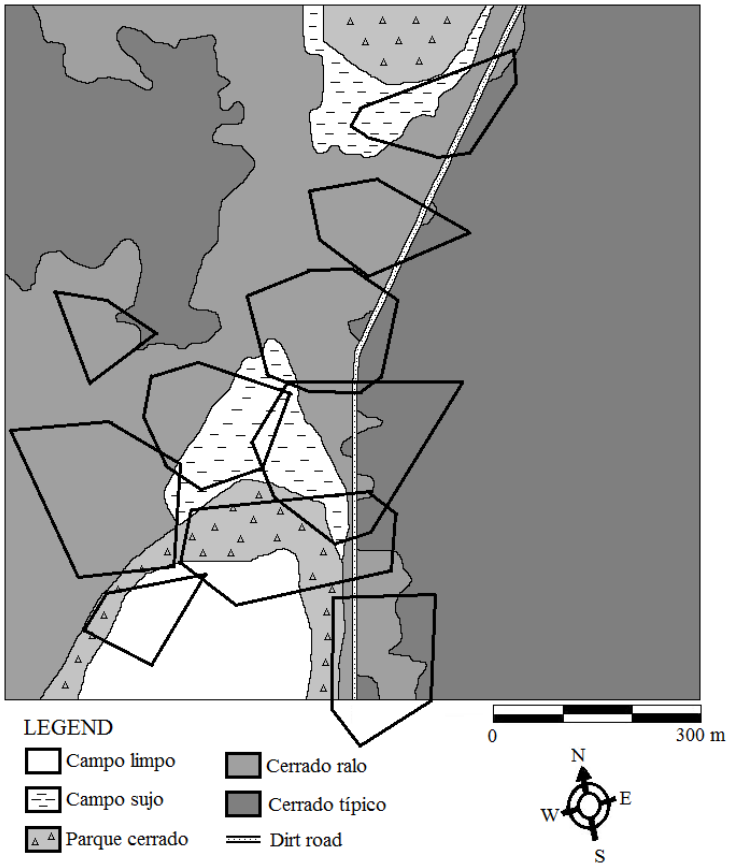

Figure 1. Ten territories (solid polygons) of *Emberizoides herbicola* delimited on the 100-ha (1 km x 1 km) plot at Águas Emendadas Ecological Station, Federal District, Brazil. Vegetation types as described in the text.

Twenty nests were found in seven years (four in 2003, five in 2004, five in 2005, one in 2006, one in 2007, one in 2008 and three in 2009). Of these, only two had no nest content even though birds were seen either building the nest or sitting on it. Thus, these two nests where not used to estimate nest success. There was a higher proportion of nests of *E. herbicola* built in open *cerrado* than in the

other vegetation types. Of the 20 nests, 60% (n = 12) were found in the open *cerrado*, 15% (n = 3) in *cerrado típico*, 10% (n = 2) in park *cerrado*, 10% (n = 2) at the *campo sujo*, and 5% (n = 1) in *campo limpo*.

We observed evidence of reproductive activity from October to March, but active nests were found only from October to December. We estimate that the earliest nest construction began in the last week of September/first week of October of 2003 by backdating a nest with a nestling that fledged around October 30. Of the two latest active nests observed, one was predated on 4 December with nestlings expected to fledge on December 10 of 2004, and the second fledged two nestlings on December 10 of 2008.

Nests were active from late September to early December, with a peak in early November. Nest initiation occurred from late September to mid-November, with a peak in late October (Figure 2). Eggs were laid from late September to late November, with a peak in early November (Figure 2). Nestlings occurred from mid-October to early December, with a peak in late November. Individuals with active brood patches were captured in October (n = 1), November (n = 2), December (n = 6), January (n = 4); February (n = 1) and March (n = 1). Juveniles were captured in December (n = 3), January (n = 2) and March (n = 1). Taken together, these data suggest that nesting is concentrated from late October to late November, but some birds might still nest from January-March.

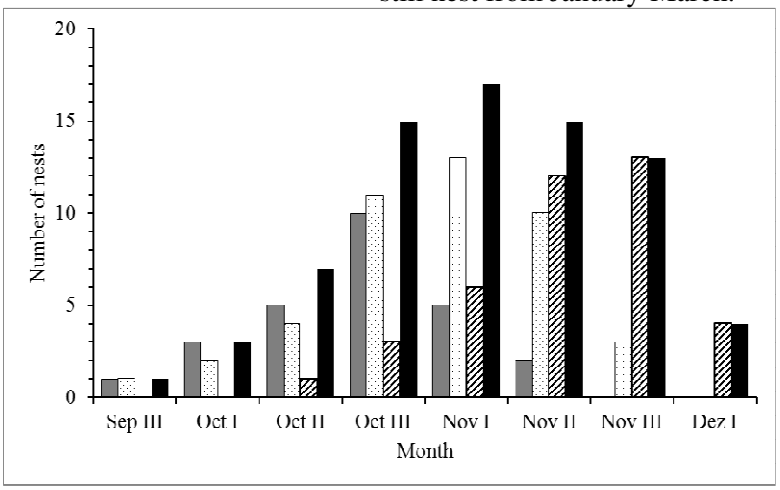

Figure 2. Estimates of the number of nests initiated (gray bars), with eggs (dotted bars), with nestlings (cross-hatched bars) and total active nests (solid bars) of *Emberizoides herbicola* at Águas Emendadas Ecological Station, Federal District, Brazil, from 2003 to 2009. Roman letters indicate 10-day periods of each month: I = from day 1 to 10; II = from day 11 to 20; III = from day 21 to 30 (or 31).

Nests of *E. herbicola* are described as open cups (SIMON; PACHECO, 2005) and were built near the ground (14.8 ± 2.0 cm; n = 17; range = 0–30 cm). Most are into a mound of grass that may or may not overhang the cup, and are usually sheltered by a nearby herbaceous plant. Nests are externally composed of thick grass and vegetable fibers with an internal cup lining of fine grass. Nest measurements are provided in Table 1.

Table 1. *Emberizoides herbicola* nest measurements at Águas Emendadas Ecological Station, Federal District, Brazil, from 2003 to 2009.

Variable	Mean	Standard error	Minimum	Maximum
External height (cm) (n = 3)	6.8	0.9	5.5	8.5
Internal cup depth (cm) (n = 4)	4.7	0.2	4.0	5.0
External diameter (cm) (n = 4)	12.2	0.5	11.2	13.5
Internal diameter (cm) (n = 4)	7.0	0,3	6.0	7.5

Clutch size was invariably two, but ranged from one to three eggs, averaging 2.0 ± 0.1 eggs (n = 15 nests) and with a mode of two eggs (n = 13 nests). However, the nest with one egg was abandoned. Eggs were laid at 24 h intervals until clutch completion. One nest with one egg had the second egg laid between 7:30h and 9:30h. Eggs were sub-elliptical and white with sparse cinnamon and black spotting heaviest near the larger end. Mean linear measurements were 22.4 ± 0.3 by 16.8 ± 0.1 mm (n = 17). Average egg mass was 3.3 ± 0.2 g (n = 12), or 12.5% of adult body mass (26.4 ± 2.3 g, n = 98). The mean incubation period was 14.8 ± 0.8 days (n = 2), range = 14–15.5 days. We saw only banded females participating in incubation. The average nestling period was 11.0 ± 0.3 days (n = 4), range 10.5–12 days. Both sexes were observed caring for nestlings and fledglings.

The nestlings of *E. herbicola* are born with pale skin and sparse beige natal down. Tarsi, beaks, and rictal flanges are yellow while the mouth lining is orange. Prior to fledging the chicks have well developed contour and wing feathers but relatively undeveloped rectrices which limit their ability to fly and confine them to the vicinity of the nest immediately after fledging. The day after fledging, one chick was observed on the ground close to the nest, and was energetically defended by its parents.

Of the 18 active nests that were closely monitored, 44.4% (n = 8) were successful. Unsuccessful nests were either depredated (38.9%, n = 7) or abandoned (16.7%, n = 3). Apparent predation rate was 14.3% (n = 1) during incubation and 85.7% (n = 6) during the nestling period. Mayfield nest success rate was 42%, with a much higher PSR during the egg (0.881 ± 0.112, n = 117.5 nest days, n = 1 nest loss) than during the nestling (0.476 ± 0.147, n = 92 nest days, n = 6 nest losses) period. DSR was 0.991 ± 0.009 during the egg stage and 0.935 ± 0.027 during the nestling period.

DISCUSSION

The fidelity of *E. herbicola* to its territory throughout the year demonstrates that it is a resident bird in the study area. Their territorial defensive behavior is mainly characterized by a song, which consists of a strong resonant whistle, composed of two phrases that form a harmonic unity (SICK, 2001) and is issued when perched on a high substrate in the territory. Stutchbury and Morton (2001) consider that for most birds in the tropics defense of a territory over the years is common and survival of adults is high.

Emberizoides herbicola had an average territory size of 3.9 ha, which is apparently the first record of territory size for this species. The small number of well estimated territories precludes further discussion on the reasons they varied in size, but habitat type explains only part of the variation. Small overlap between neighboring areas was observed for *E. herbicola*, as reported for other Neotropical passerines (GREENBERG; GRADWOHL, 1986; DUCA; MARINI, 2005). Part of the overlap observed may be due to minor adjustments of territory limits throughout the year. Most part of the territories and most nests were in open *cerrado*, revealing the importance of this vegetation type for breeding and conservation of this species. The preference for open *cerrado* may be related to higher availability of nesting sites with abundant grasses, but also to higher availability of food than other more open habitats. However, other vegetation types were also used as territories or to build nests, revealing some reproductive plasticity. Similarly, Tubelis and Cavalcanti (2000) showed a higher abundance of *E. herbicola* in natural open grasslands than in *cerrado típico*. The close related *Embernagra longicauda* has a territory size of similar size (3.35 ha) in *campos rupestres* (rocky fields), also with little overlap between neighboring territories (FREITAS; RODRIGUES, 2012).

The reproductive period for *E. herbicola* is estimated to be late September to December, similar to most species that breed in the region. Their reproductive period, limited to the rainy season, is similar, but slightly earlier than other species of finches studied at the Cerrado: *Sicalis citrina* (GRESSLER; MARINI, 2011) and *Sporophila caerulescens* (FRANCISCO, 2006) from December to May, and *Volatinia jacarina*, from November to April (AGUILAR et al., 2008). Tanagers (*Neothraupis fasciata* and *Cypsnagra hirundinacea*) of similar body size reproduce in the same study site from August to December (SANTOS; MARINI, 2010; DUCA; MARINI, 2011). Evidence of reproductive activity of *E. herbicola* were also recorded for the months of September and October 1971 and November 1977 by direct observation of gonads developed on individuals collected by Belton (1994) in Brazil southern region. Di Giacomo (2005) reports breeding mostly from November to January, but also one nest in March in Argentina. In agreement with the nesting data, molt of flight feathers starts around mid-January until the end of May, with 19-28% of molt and breeding overlap at our study site (SILVEIRA; MARINI, 2012).

Like most of its family members, *E. herbicola* is essentially gramnivore, and has its reproduction dependent on the maturation of grass seeds, which in turn depends on rainfall. In the nesting period of *E. herbicola*, the seeds of many grasses are ripe, but the beginning of the reproductive cycles of many annual native grasses in the Federal District, either coincides with the rainy season or starts later in the rainy season (ALMEIDA, 1995). The reproduction of *E. herbicola* supports the relationship between the availability of food (seeds) and breeding of granivorous species during the rainy season in the Cerrado biome (NIMER, 1979). However, some other gramnivores in the Cerrado breed during most months of the year (CINTRA, 1988; MARINI et al., 2010).

The species builds its nest near the ground at the base of clumps of grass and the same can be observed in another study for the same species (RODRIGUES et al., 2009). Nests were built with thick fiber grasses and vegetable fibers coated inside with fine grass, similar to nests of other family members, such as *Emberizoides ypiranganus* and *S. citrina* (DI GIACOMO, 1998; RODRIGUES et al., 2009; GRESSLER; MARINI, 2011). *Emberizoides herbicola* nest has lower overall height than the outside diameter and is supported by the base, classified as a type of "low cup/base" (SIMON; PACHECO, 2005). Their measurements were similar to that found by Rodrigues et al. (2009).

The clutch size of two and the coloration of *E. herbicola* eggs were similar to the description in Rodrigues et al. (2009). However, it lays two or three eggs in Argentina (DI GIACOMO, 2005). Eggs in our study were similar in size to those described for *E. herbicola* by Di Giacomo (2005) but smaller than the measurements provided by Rodrigues et al. (2009). The proportion of egg to adult mass (12.5%) is similar to expected for an altricial bird of its size (WINKLER, 2001).

The incubation period (14–15.5 days) was similar to the finches *Poospiza nigrorufa* (14 days) (DE LA PEÑA, 2005), *Embernagra platensis* (15 days) (DI GIACOMO, 2005) and *Buarremon torquatus* (15.8 days) (AUER et al., 2007) and greater than in other Neotropical finches that are also found in the study area, such as *S. caerulescens* (12 days; DI GIACOMO, 2005), *S. citrina* (12 days; GRESSLER; MARINI, 2011) and *V. jacarina* (13 days; DI GIACOMO, 2005) or elsewhere (*Sporophila hypoxantha,* 12 days, FRANZ; FONTANA, 2013). The length of stay of nestlings in the nest (10.5–12 days) is within the pattern found for the same species (10–13 days; DI GIACOMO, 2005) and similar to that found for Neotropical finches, *Zonotrichia capensis* (11–13; DE LA PEÑA, 2005), *E. ypiranganus* (9-11; DI GIACOMO, 2005), *S. citrina* (13 days; GRESSLER; MARINI, 2011), and *S. hypoxantha* (9-10 days; FRANZ; FONTANA, 2013).

Apparent nest success of 44.4% was similar to Mayfield nest success (42%), and were relatively high when compared to tanagers (*N. fasciata* (29%) (DUCA, 2007) and *C. hirundinacea* (33%) (SANTOS, 2008)), breeding in the same study area. *Sicalis citrina* had a lower apparent success rate of 29% in the Federal District (GRESSLER; MARINI, 2011), like other Passeriformes in other regions of central-western Brazil (AMARAL; MACEDO, 2003; PINHO et al., 2006). Similar to *E. herbicola*, two other open-cup nesters, *Mimus saturninus* (RODRIGUES, 2009) and *Tyrannus savana* (MARINI et al., 2009a), also had higher nesting success in the same study area.

Nest predation rates may be affected by nest concealment and location (WINKLER, 2001). Our sample size was not high enough to test any hypothesis related to nest location, but nest height above the ground probably is not an important factor for this species since nests were on or close to the ground. Other studies at the same study site revealed that nests are predated mostly by birds, such as *Cyanocorax cristatellus* (FRANÇA et al., 2009; FRANÇA; MARINI, 2009), which are able to locate nests visually from above or by following adults.

Nest predation was much higher during the nestling than the egg period, as predicted by SKUTCH's (1949) hypothesis, which states that nests will have higher predation probability as they get older, mostly due to higher activity by parents. Like *E. herbicola*, lower nest predation rates during the egg stage have been reported for several species, such as *Sicalis luteola* (MASON, 1985), *S. caerulescens* (FRANCISCO, 2006), *Z. capensis* and *B. torquatus* (AUER et al., 2007), *S. citrina* (GRESSLER, 2008), and *M. saturninus* (RODRIGUES, 2009). Some other species, however, had the opposite pattern, with higher predation rates during the egg stage ((*Z. capensis* (MASON, 1985), *V. jacarina* (AGUILAR et al., 2008), and *Elaenia cristata* (MARINI et al., 2009b)). Also, the three cases of nest abandonment occurred during the egg stage, and not the nestling stage. This is expected since birds tend to abandon nests in the first stages of nesting when parental investment is still low (WINKLER, 2001).

Our data on the characteristics of nests and eggs are similar to those described in the literature. However, new data on the reproductive biology of

the species are recorded, such as territory size and habitat use, reproductive period, incubation period and length of stay of nestlings in the nests, and nest success rates.

This study adds important information about the natural history of *E. herbicola*, contributing to understand its biology, still little known despite its broad geographic distribution. Geographical differences, such as the smaller egg size reported above (see DEL HOYO et al., 2011) still require further studies and explanations.

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RESUMO: *Emberizoides herbicola* (canário-do-campo), Emberizidae, Passeriformes, é uma espécie campestre, residente em áreas abertas e que habita capinzais altos, secos ou úmidos. Sua história de vida é muito pouco conhecida, sendo a sua biologia reprodutiva abordada pelo presente estudo quanto aos seguintes aspectos: biologia da nidificação, territorialidade e uso de hábitat. O estudo foi realizado na Estação Ecológica de Águas Emendadas, DF, Brasil, entre 2002 e 2009. Indivíduos anilhados de *E. herbicola* possuem um território médio de 3,9 ha (n = 6). Vinte ninhos foram monitorados a cada 2–4 dias, dos quais 18 estavam ativos. O período reprodutivo estendeu-se de outubro a março, mas a postura de ovos ocorreu entre o início de outubro e meados de novembro, com pico no final de outubro. Ninhos foram construídos próximos ao solo (altura média = 14,8 ± 9,0 cm, n = 17) com período de incubação de 14,8 ± 0,8 dias (n = 2) e a período dos ninhegos de 11 ± 0,6 dias (n = 4). O tamanho da ninhada foi de dois, mas variou de um a três ovos, com média de 2,0 ± 0,4 ovos (n = 15). Entre os 18 ninhos monitorados, 44,4% obtiveram sucesso, 38,9% foram predados e 16,7% foram abandonados. A taxa média de predação foi de 85,7% para ninhegos e 14,3% para ovos. A taxa de sucesso de Mayfield foi de 42%, com uma maior probabilidade de sobrevivência (PSR) durante o período de incubação (0,881 ± 0,112) do que durante o período de ninhego (0,476 ± 0,147). A maioria dos ninhos (n = 12) foi construído em cerrado ralo que pode ser considerado a fitofisionomia mais importante para a espécie, tanto para defesa de territórios como para nidificação.

PALAVRAS-CHAVE: Área de vida. Biologia reprodutiva. Cerrado. História de vida.

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