

DRY SEASON NESTING OF THE GOLDEN SPARROW
NEAR RICHARD-TOLL, SENEGAL

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The Golden Sparrow (*Passer luteus*) is a very numerous species in the Sahelian region of western Africa whose biology and role in crop depredation are only now beginning to be evaluated and understood. In the Senegal River Valley, the species normally nests from July to September, during the period of the rains. However, a small population of birds nested in this region in 1975 during the dry period of April and May.

Morel and Morel (1973 ; 1976) have described in detail the nesting activity of the species during the wet season, but their information on dry season nesting is extremely limited. The intent of this study was to supplement their data on the Golden Sparrow's nesting success and biology and compare it with the events of the forthcoming wet season.

METHODS

Study sites : Three collection sites between 74 and 77 km from St Louis north towards Richard-Toll were designated for study. Two sites were sparsely vegetated (site no. 1 = 750 m² ; site no. 2 = 3000 m²), and the third site was a 3600 m² densely vegetated, shallow depression. The terrain was windswept and sandy, in a semi-arid region of slightly siliceous and halomorphic soils (Maignin, 1965). The vegetation was primarily *Tamarix gallica*, *Acacia nilotica adansonii* and *Balanites aegyptiaca* (Berhaut, 1967). Water was available at large irrigated rice and sugar cane schemes five to ten km distant. A roost of about one million bird was found in the sugar cane at Richard-Toll.

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Observation procedures : Five visits were made to the nesting area between 14 April when nests were first seen and 30 May when all birds had left. The frequency and height of nests in the trees, and of nesting trees were determined for each area. Heights normally were measured with a graduated pole. At least ten nests/site usually were inspected for their stage of completion each visit, and the presence of eggs, nestlings, fledglings and excrement recorded. All eggs were observed for embryos. Morphological measurements and stomach contents were noted for all young birds collected. Adults were collected for gonad analysis, aging by cranial pneumatization, brood patch observation and crop content identification. Sample sizes were small by necessity because of nesting site instability and the low productivity of this small population.

RESULTS AND DISCUSSION

Nest success and distribution : Nesting success was very low, with about 50 % of the 120 observed nests completed, and only two - three percent of these containing eggs or nestlings. Three fledglings were found. The only indication of perhaps a slightly higher nesting success was the presence of excrement, presumably left by birds having fledged between observation periods, in 14 % of the nests (Table I).

Males carried nesting material to the nests and displayed to females throughout the nesting period. Testis development appeared complete by 2 May since their lengths were nearly identical on this date (7.2 ± 1.7 mm ; $n = 6$) and 14 May (7.3 ± 1.5 ; $n = 2$). In contrast, ovarian follicle lengths increased from 1.8 \pm 1.1 mm on 2 May, to 2.1 \pm 0.9 mm on 14 May (5 and 7 females, respectively). The gonad, fledgling and excrement data indicate that the laying period probably was in early May.

A distinct difference in nesting habits was evident between sites. Differences in tree height, nest height and number of nests/nesting tree were significant ($P < 0.01$; t-test, Sokal and Rohlf, 1969) between the first site and each of the other two sites. In site no. 1, trees were scattered at approximately 50 m intervals, were small (2.5 m avg.) and the nests were constructed less than one metre off the ground. Thirty-three percent of the trees contained nests, with an average of one nest/tree. Only 30 % of the nests were completed.

Contrastingly, in the other two sites, trees were as close as 5 m, were 3.5 m tall and nests were constructed at 2.5 m. Site no. 3 with 340 nests/ha and about 200 birds on 22 May was the most active. It averaged 2.1 nests/tree with 50 % of them completed.

TABLE I
Dry season nesting success of Passer luteus
near Richard-Toll, Senegal, 1975

date	study site	no.trees observed	% trees w/nests	no.nests observ.	Percent of nests with				
					nest cup ^N	eggs	nest- lings	excre- ment	fledg- lings
14 Apr	2	62	56	10	30	0	0	0	0
18 Apr	2	15	46	10	40	0	0	0	0
2 May	(avg/3 sites)	49	76	37	38	5 *	3a	3	0
14 May	3	10	70	16	75	0	6 **	6	0
22 May	(avg/3 sites)	10	53	47	47	0	2	26	5
Total	or avg :	263	68	120	54	2	3	14	2

N = indicates completed nests

* = 2 fertile eggs in 2nd or 3rd day of incubation

a = 7 nestlings 2 days old

** = 1 nestling 8 days old.

The complete nesting failure at the first site might perhaps be explained by insufficient suitable habitat, with nest site preference probably determined or at least influenced, by tree height. *Passer luteus* may require trees of 4-5 m in height. Morel and Morel (1973) have reported most wet season nests were in trees of this height.

Alternatively, failure at this first site, and the low reproductive rate throughout the colony, may have resulted from an insufficient number of birds for mutual stimulation. This phenomenon of group stimulation has been reported for numerous bird species nesting in arid areas (Serventy, 1971), and alluded to for *Passer luteus* in Sudan from the nesting descriptions of Allan and Jackson (1973). Mutual stimulation may be particularly important for group synchronization and acceleration of ovulation in dry season nesting efforts in arid countries.

Nests were constructed by males in both breeding and non-breeding plumage and based on cranial pneumatization data most likely by some individuals less than one year old. The craniums of only two of 15 females were completely pneumatized. Therefore, the nesting population may have been composed primarily of sexually immature birds. Also, a male in non-breeding plumage with enlarged testes and a cranium less than 50 % pneumatized was collected. However, caution must be used in interpretation of these data since this aging method, as used by Ward (1973) for *Quelea quelea*, has not yet been evaluated for the Golden Sparrow.

Nest construction : Birds nested primarily in *Balanites aegyptiaca*, as reported by Morel and Morel (1976), and to a lesser extent in *Acacia nilotica*. Most nests were constructed with twigs of *Acacia*, *Borreria* and *Tamarix* and to a limited extent of *Balanites*. Excepting *Balanites*, this probably reflected the availability of these materials in the area (Table II). There may have been insufficient grasses and *Tamarix* during the dry season to make a cup effectively covering the 29-43 mm long spines of *Balanites*.

The nest weighed 207 g, similar to the minimum size found by Morel and Morel (1976) during the rainy season, but 45 % less than his 377 g average. Seventy-four percent of the 865 twigs comprising the nest were between 1 and 10 cm in length, compared to about 50 % in those nests studied by the Morels (1976). Therefore, although the nest weighed less than those of the wet season, it was made with nearly the same number of twigs, but with a predominately greater percentage of small ones. The nest cup weighed 16 g and was of soft materials, grasses, *Tamarix*, *Suaeda*, feathers, string and cloth.

Food habits : During early development (i.e. until 8 days) nestlings were fed both insects (ants) and weed (*Panicum*) seeds

TABLE II

Plant species composition by weight and length of nesting material from a dry season Passer luteus nest in May 1975

Material	% by weight	length (cm)				% twigs by species
		1-10 %	11-20 %	21 + total %	(n)	
EXTERIOR (207 g total wt.)						
Mimosaceae - <u>Acacia</u> spp	54.0	78	21	1	313	36
Rubiaceae -						
<u>Borreria verticillata</u>	24.4	67	33	2	164	18
Tamaricaceae -						
<u>Tamarix gallica</u>	11.6	78	20	2	300	35
Unidentified *	6.4	47	47	6	35	4
Graminaceae - <u>Echinochloa</u>	1.1	78	17	6	35	4
Rhamnaceae -						
<u>Zizyphus mauritiana</u>	1.0	60	40	0	5	1
Zygophyllaceae -						
<u>Balanites aegyptiaca</u>	0.5	50	40	0	2	0
Chenopodiaceae- <u>Suaeda</u> spp	0.5	50	50	0	4	1
Leguminosacea -						
<u>Indigophera</u> sp.	0.3	100	0	0	3	0
Convolvulaceae	0.2	50	50	0	4	1
Total :	100	74	24	2	865	100
INTERIOR (16 g total wt.)						
Tamaricaceae, Graminaceae, Chenopodiaceae, feathers (Columbidae and Ploceidae)						
string and cloth strip						

* probably branches of same species, but too old and weathered for identification.

(Table III). Ants may have been collected by the adults at ant's nests, a behaviour observed near Lake Rkiz, Mauritania on 2 May. During fledgling, young were fed only weed seeds. Nineteen adults collected during the study with food in their crops had eaten *Panicum*. Their dried crop contents averaged 0.07 g and 0.08 g, respectively, for females and males.

This feeding pattern contrasts with that known for the species during the normal nesting period. Morel and Morel (1976) found only insects (of several families) in the stomachs of nestlings in Senegal. Similarly, 87 % of 72 nestlings collected in Mali in September 1975 also had been fed insects (Bruggers, unpublished data).

TABLE III

Stomach content analysis from seven Passer luteus nestlings and fledglings collected from a dry season nesting colony near Richard-Toll, Senegal

date	n	age (days)	avg wt (g)	seeds			insects			avg (g)
				no	gr	% by wt	no	%	by wt	
2 May	4	2*	3.8	55	58	28	42	0.08		
14 May	1	8	13.0	62	100	0	0	0.05		
22 May	2	10**	15.0	57	100	0	0	0.05		

* all nestlings from the same clutch

** both nestlings from different clutches.

Finally, in colonies of low nesting success, fledglings may be fed by non-breeding females or females whose nests have failed. This apparently was the case on 22 May when four females were seen feeding one fledgling. Only one of these females appeared to have had a brood patch. The crops of all five birds contained only *Panicum*.

SUMMARY

A small, dry season *Passer luteus* nesting colony was studied near Richard-Toll, Senegal in April and May 1975. Differences between this colony and wet season colonies included a) smaller nests of somewhat different material ; b) lower nesting success ; and c) the presence of weed seeds in the diet of nestlings.

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