



Breeding Biology in Hybrid Sparrow (*Passer domesticus* × *P. hispaniolensis*) in Northern Algerian Sahara: Case Study of Biskra Date Palm-Grove

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Abstract: The Hybrid Sparrow's reproduction was monitored in two stations, in the Filiach region at 5 km from Biskra (5°45'E, 34°50'N), on the one hand in a suburban (Tahraoui) and secondly date-palm-grove (Khiredidine). To this end, we identified 327 nests of *Passer domesticus* × *P. hispaniolensis* with 221 nests placed in holes on walls and in the hangar roof of the Tahraoui's farm. A set of 106 nests was installed in a livestock hangar in the date palm-grove of Khiredidine. A sample of 52 nests was considered (27 nests in Tahraoui and 25 in Khiredidine). On these 52 nests were followed on three consecutive clutches. The height of the nest location is between 2.4 and 5.5 m in Tahraoui's farm where the clutch size varies between 1 and 5 eggs with a mean of 4.15 ± 1.14 during the first clutch, 3 to 6 eggs (mean = 4.9 ± 0.99) during the second clutch and 2 to 4 eggs (mean = 3 ± 0.82) for the third clutch. The most common clutch size is five eggs (AR% = 37.0%). In the palm-grove of Khiredidine, the height of nest location varies between 2.7 to 3.4 m; where in a hutch size of 3 to 5 eggs (mean = 4.4 ± 0.89) was noted during the first clutch, 1 to 6 eggs (mean = 3.93 ± 1.38) during the second clutch and 2 to 4 eggs (mean = 3.5 ± 0.84) during the third clutch. The common clutch size is four eggs (AR% = 44%). Over the three clutches, the representative hatching rate is the third clutch with 93.8% in the first farm and 90.5% in the second.

Keywords: Breeding, Hybrid Sparrow, *Passer domesticus* × *P. hispaniolensis*, Date Palm-Grove, Biskra, Algerian Sahara.

1. Introduction

The Hybrid Sparrow (*Passer domesticus* × *P. hispaniolensis*) is very common in regions of Ziban (Northern Algerian Sahara). It is, without doubt the most abundant species in the date palm-grove. Over the two past decades, its population growth is enhanced by the installation of the cereal fields in southern Algeria. Yet until now, no study on the Hybrid Sparrow reproduction in Saharan environments that are frequented by this species was made. At most, in 1962 near El-Golea (Middle of Algeria), Heim De Balsac & Mayaud (1962), focused on the clutch-size of *Passer domesticus* × *P. hispaniolensis*. As against North

Algeria, in the plain of Mitidja, studies on reproduction were carried out by Madagh (1996); Bendjoudi & Doumandji (1999); Lakrouf (2003) and Ait Belkacem (2004).

2. Study Sites and Methodology

The presentation of study stations and nesting sites, the nests counting and monitoring of eggs and chicks are taken into account.

2.1 Presentation of the study area

This study is carried out in the Ziban region precisely Filiach (5° 45' E, 34° 50' N.) at about 5 km

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southeast of Biskra (North-eastern Algeria). We choose two nesting sites of the Hybrid Sparrow; the first is the Khireddine date palm-grove and the other is the industrial farm of Tahraoui. Khireddine property covers about 70 hectares, of which 60 ha is occupied by crops and 4.000 stands of date palms (*Phoenix dactylifera*). Outside the palm grove, there are cattle sheds, sheep and avian. Not far away, the second station is represented by the industrial farm of Tahraoui stretching over 4 hectares.

2.2 Determination of nesting sites

During the construction phase, nests are the easiest to spot. Usually, they are marked at the slots on the walls and roofs in the hangars. Nevertheless, the Hybrid Sparrow nests rarely on trees. As part of this study, surveillance were made by observing the high shrub layer in particular *Phoenix dactylifera*, *Casuarina torulosa*, *Eucalyptus* sp. and *Tamarix gallica*.

2.3 Nests counting and monitoring of eggs and chicks

For the nests counting in the two study sites, we have identified as a first step the various dormitories preferably frequented by Sparrows. Thereafter, we recorded 327 nests of *Passer domesticus* × *P. hispaniolensis* which 221 nests in Tahraoui and 106 in the Khireddine palm grove. On the field, using a ladder we measure the height of the nests from the ground and observe their contents.

During the first clutch in mid-March 2007, 13 nests in Tahraoui and 5 nests in Khireddine are examined. Throughout the second clutch that began on 28 April 2007, at 10 nests at Tahraoui and 14 nests at Khireddine are considered. During the third clutch from the beginning of June, 4 nests at Tahraoui and nests in Khireddine are examined. For their measurements and weighing, eggs and chicks are collected and placed in cotton to protect them from cold on the one hand and to not impregnate them with the others smell on the other hand.

3. Result

3.1 Courtship

The courtship with *Passer domesticus* × *P. hispaniolensis* in the region of Filiach begins early in

February, on February 5 at 2007. However, the rallies for the couples' formation are observed whatever the weather. Either, during the days of this month, sparrows reassemble and become very active. It is mainly males who appear by screams, incessant go and back, making on ground small arcs, feathers puffed, pending the wings and tail raised. However, the females contrast with their inaction. They remain either in the palm crowns of *Phoenix dactylifera* or on the roofs of the hangars.

3.2 Nesting

This section begins with the coupling. At the same time nest selection and construction made by the male. Shortly after clutch, incubating and hatching eggs are held.

3.3 Coupling

The results are reported in Table 1. Immediately after the courtship and mating take place either on a palm or on a wall or on the roof of a shed or even on the ground. Six couplings are observed with the first five are reported in hangars and on the palms of *Phoenix dactylifera* or branches of *Olea europaea*, *Eucalyptus* sp. and *Tamarix gallica*. The sixth mating is observed in the fence wall. The number of matings per series is between two and six. Most of the Hybrid Sparrow's mating is observed during the morning between 8:00 and 11:00, rarely in the afternoon between 14:00 and 16:00. Each mating is brief. It takes only 3 to 4 seconds. However, it is repeated several times between two and six, one after the other (Table 1).

3.4 Location and construction of nests

Out of nearly 180 nests, thirty for each of six hangars, a sample of 8 are considered where the locations of installation are shown in Table 2.

Usually, the Hybrid Sparrows placed their nests in holes in the closure walls of Tahraoui. As against the farm of Khireddine date palm-grove Sparrows install their nests within the breeding hangars. The height of the nest's location is often between 2.5 m and 2.7 m in Tahraoui and between 3.3 m and 3.5 m in Khireddine. It is noted that the percentage of Sparrow nests present in the north exposure are high, at 62.2%. As against those looking to the South are low, only 25%.

Table 1. Dates, times and no. of mating with seconds in the Hybrid Sparrow in Filiach during the reproduction period (2007 & 2008).

S. No.	Station	Parameters		
		Mating Dates	Mating Number	Coupling Duration
1.	Hangar roof (Palm. Khireddine)	30 III 2007	3	4"
2.	<i>Phoenix dactylifera</i> (Palm. Khireddine)	1 IV 2007	4	3"
3.	<i>Olea europaea</i> (Palm. Khireddine)	2 IV 2007	2	4"
4.	<i>Eucalyptus</i> sp. (Br.-wind in Khireddine)	6 III 2008	3	3"
5.	<i>Tamarix gallica</i> (Br.-wind in Khireddine)	6 III 2008	2	4"
6.	Closure wall (Tahraoui farm)	2 IV 2007	6	4"

(Palm: Date palm-grove; Br.-vent: Break-wind; ": seconds)

Table 2. Locations of the Hybrid Sparrow nests during the breeding periods of 2007 to 2008 at Filiach.

No. nest	Stations	Nest Supports	Nest Height (m)	Exposure
1	Tahraoui	Beam	2.70	East
2	Tahraoui	Hole (wall)	2.60	North
3	Tahraoui	Hole (wall)	2.60	North
4	Tahraoui	Hole (wall)	2.50	North
5	Khiredidine	Hangar (Framework)	3.50	North
6	Khiredidine	Hangar (Framework)	3.40	North
7	Khiredidine	Hangar (Framework)	3.30	South
8	Khiredidine	Hangar (Framework)	3.40	South

Table 3. Supports nests and hatching success for nests during the three clutches of Hybrid Sparrow in both locations in 2007.

Clutch	Nests	Laying dates	Nest Supports	Clutch size (egg)	Chicks hatched per nest	Success rate (%)
1 st	1	30 - III	Hangar of Khiredidine	4	3	75
	2	30 - III	Hangar of Khiredidine	5	5	100
	3	31 - III	Wall of Tahraoui	5	5	100
	4	31 - III	Wall of Tahraoui	5	4	80
2 nd	5	21 - IV	Hangar of Khiredidine	6	4	66.7
	6	21 - IV	Hangar of Khiredidine	5	5	100
	7	22 - IV	Wall of Tahraoui	6	4	66.7
	8	22 - IV	Wall of Tahraoui	5	3	60
3 rd	9	2 - VI	Hangar of Khiredidine	6	6	100
	10	3 - VI	Hangar of Khiredidine	4	4	100
	11	7 - VI	Wall of Tahraoui	3	3	100
	12	11 - VI	Wall of Tahraoui	4	3	75
Total				58	49	
Means				4.8 ± 0.9	4.1 ± 1.0	85.3 ± 16.2

Three successive clutches are followed during the breeding season in 2007 (Table 3). Each one lasts 35 days from the issuance of the first egg to young fledging. First clutch starts in mid-March 2007. Second clutch was recorded between late April and early May. As for the third clutch, it starts from the beginning of June 2007. The mean of eggs laid during the three clutches was 4.83 ± 0.82 per nest. Similarly, the mean of chicks hatched per nest is 4.08 ± 0.89 (Table 3). The success rate of eggs hatched per nest is equal to 84.5% (89.5% for 1st clutch, 72.7% for 2nd clutch, 94.1% for 3rd clutch).

4. Discussion

4.1 Courtship

The courtship observed in *Passer domesticus* × *P. hispaniolensis* in the Filiach region whatsoever in the Khiredidine date palm-grove or industrial farm of Tahraoui; begins in early February (February 5th, 2007). It was at that time that gatherings for training couples express. During this period, there is a resurgence of activity including the movement of males as reported by Bortoli (1969) and Tunisia and Felix (1991) in Europe for the House Sparrow. In the eastern part of the Mitidja reproduction in *Passer domesticus* × *P. hispaniolensis* coincides with the late winter and early spring (Ait Belkacem *et al.*, 2003). In the region of Oran (west of Algeria) Metzmacher (1985) points out that the maximum of courtship is observed during the afternoon. Mezenner (1989) and Madagh (1996), in the experimental station of the technical institute Crop in

Oued Smar near Meftah (Algiers), note that bridal parades take place in February and March.

4.2 Mating in Hybrid Sparrow

All exhibitions of nuptial courtship lead to the coupling which takes only a few moments and can be repeated several times (Doumandji & Doumandji-Mitiche, 1994). In Filiach region, the coupling time among the Hybrid Sparrow is short. The number of matings is between 2 and 6 (Table 1). Most of the couplings in 2007 were observed during the morning between 8:00 and 11:00, rarely in the afternoon between 14:00 and 16:00. The duration of each mating is very short 3 to 4 seconds. These data differ from those of Bendjoudi (1999) who reported that the number of sexual relationships observed in the north of Algeria at Oued Smar varies between 7 and 14; also, the duration of each is between 2 and 4 seconds. In the same way Lakrouf (2003), in the north of Algeria, noted the length of a coupling fluctuates between 3 and 8 seconds. White-Killer *et al.*, (2000) note the size and degree in House Sparrow's fertility is based on the phenomenon of coupling. In addition, they show that males with a large black spot are more aggressive and more violent in territory defense and have high fertility compared to those with a small dark patch on the throat.

In the same sense, Witschi & Woods (1936) reported that during the breeding season, beak colour of male Sparrow varies clearly according to the presence of the male sex hormone. The beak becomes black while during the rest of the year it is quite clear. However, the female beak is brown (Keck, 1934).

4.3 Location and construction of nests

In the study area, the Hybrid Sparrow installs often nests in the holes of the closure walls at the Tahraoui's industrial farm. As against in the Khireddine's date palm-grove farm, this bird places its nest inside the breeding hangars (Table 1). Indeed, it was counted about 30 nests in each of 6 hangars. These nests are placed at a height of 2.5 to 2.7 m in the Tahraoui's farm and 3.3 to 3.5 m in the date palm-grove of Khireddine (Table 2). It should be noted that no author has estimated nest heights of Hybrid Sparrows. Bendjoudi & Doumandji (1999) indicate that the formation of new nests in the Hybrid Sparrow appears on March 4th, 1998. According to Doumandji & Doumandji-Mitiche (1994), Sparrows placed their nests in cavities at the facades of buildings such as air vents, exhaust pipes, curtain window slats coils, chimneys, street lamps and on *Washingtonia filifera*, *Phoenix canariensis* and *Cupressus sempervirens*.

Usually, the nest is located in a hole or a crack in a building. This is the case at Filiach. In extreme northwest Algeria, at the Es - Sénia plain near Oran, Metzmacher (1985) indicates that nests of *Passer hispaniolensis* were distributed essentially on hurdles of *Acacia* Sp. and secondarily in some jujube tree *lotus Ziziphus* and a few olive trees *Olea europaea*. Similarly, in Western Algeria, Ould Rabah *et al.*, (2004) observed *Passer hispaniolensis* places its nests on *Pinus halepensis* with a rate of 26.1%, on *Acacia eburnea* (23%), on *Eucalyptus* sp. (21.4%) and *Olea europaea* (15.1%). Berville and Gauthier (1961) note that the House Sparrow nests in holes of walls, under the tiles and bushy trees. The observations made on Filiach nesting sites chosen by the Sparrow agree with those of Berville & Gauthier (1961). Moreover, sparrows moved frequently in nests of House *Martin Delichon urbica* and Barn Swallow *Hirundo rustica*, in the branches of White Stork *Ciconia ciconia* nests, in nest boxes, holes in hollow trees and rocks (Cuisin, 1992; Bertrand, 1996; Indykiewicz, 1998). The parasitism of *Delichon urbica* nests by *Passer domesticus* (probably) is also recorded by Farhi *et al.*, (2003) and Daoud-Hacini (2004).

Besides, during this study, it was seen in a well near Oued Sidi Zerzour (Biskra) some couples of Hybrid Sparrow currently nesting. This observation agrees with that of Blagosklonov (1987) who writes that sometimes sparrows nest in wells.

The first movement for the nest's construction was observed in mid-March at the Khireddine's farm where males and females participate by bringing twigs of dry grass, stalks of spontaneous or cultivated grasses and by leaflets. Similarly, there was an animal part that used in building the nest. It is composed of feathers, animal hair, wool and even human hair.

Most nests (62.2%) in the two-studied area are directed towards the North. It should be noted that Lakrouf (2003) shows that 54.6% of the Hybrid

Sparrow nests in Mitidja are oriented towards the south in 2000, while 47.1% were in 2001. However, in 2001, Ait Belkacem (2004) states that 53.2% of nests in the same species are exposed to the South and those placed eastward correspond to 22%. In addition, 18.5% of the buildings are oriented to the North and 6.3% to the West. In conclusion, there is a difference in Hybrid Sparrow behavior; it prefers the exposure on the South Coast to take maximum advantage of the heat. As against in Biskra, rather the exposure North is probably sought to reduce the drought effects of the sun.

4.4 Laying, incubation and hatching in the Hybrid Sparrow in Filiach

This phase lasts between 11 and 13 days. The first egg laying begins in mid-March in the station of Tahraoui and palm-grove of Khireddine.

The first visited nests contain eggs slightly elongated, greenish substance in clear and tinted brown spots. Sometimes the tint can be in clear bluish with fine dots of colour brown and gray (Heim de Balsac & Mayaud, 1962). During two years of study in Filiach, three successive clutches of Hybrid Sparrow are followed. Each one lasts 35 days from the issuance of the first egg until the young leave the nest. In the eastern part of Mitidja, Ait Belkacem *et al.*, (2003) indicate that the first egg is laid March 10th, 2001. In this study, it is noticed that the first clutch begins in mid-March, which confirms the observation of Ait Belkacem *et al.*, (2003). In Filiach, the 2nd clutch was recorded between late April and early May, which confirms the comment of Bendjoudi (1999) who write that the second clutch in the plain of Mitidja began in late April and ends in mid-May. As for the third clutch in our stations, it starts from the beginning of June 2007 and ending towards the end of July. In Mitidja (Bendjoudi, 1999; Lakrouf, 2003; Ait Belkacem *et al.*, 2003), the third clutch begins in mid-June. In this study mean of eggs laid during the three clutches was 4.83 ± 0.82 per nest (Table 3). Indeed the results of this work are comparable with those obtained in other places in the Sahara near El-Golea and In Salah (HEIM de Balsac & Mayaud, 1962). In fact, these two authors show that the clutch size is between four and six eggs for *Passer domesticus* and 3 to 5 in Hybrid sparrow. Similarly, the values presented in this study are comparable to those found in Mitidja in the same species; Bendjoudi & Doumandji (1999) noted 4.3 ± 0.10 eggs per nest, Lakrouf (2003) with 4.4 eggs per couple and Ait Belkacem *et al.*, (2003) with 4.2 ± 0.75 eggs. In Europe, *Passer domesticus* can lay eight eggs (Felix, 1991). Furthermore, Alonso (1984) finds that the clutch size was 5.0 eggs for *Passer hispaniolensis* and 4.9 eggs for *Passer domesticus*. Metzmacher (1990) asserts that the clutch size of *Passer domesticus* is between 3 and 6 eggs with a mean of 4.8 eggs per nest.

Specifically, in *Passer hispaniolensis*, Ait Belkacem (2004) notes near Oran a mean of 3.4 ± 0.74

eggs. Finally, according Doumandji & Doumandji-Mitiche (1994), the clutch size among sparrows is variable and depends on several factors such as the health of the female, its age, dietetic and climatic conditions of wintering place, conditions of the prenuptial migration, abundance or scarcity of food resources in the breeding area and physiological status of the male. According to Lakrouf (2003), the rate of hatchings varies between 40% during the 2nd clutch and 100% for the 1st clutch in 2000. A Filiach, the mean of fledglings per nest is 4.08 ± 0.89 (Table 3). It is little lower than the mean of 3.45 recorded in Mitidja by Lakrouf (2003). Metzmacher (1990) argues that in *Passer domesticus* hatching rate is 87.9%. In the same region near Oran, Ait Belkacem (2004) states that at *Passer hispaniolensis* the percentage of hatching success ranges from 40% at the 1st clutch to 80% for the 2nd clutch, which corresponds to a mean of 3.8 eggs hatched per nest. Metzmacher (1990) wrote that the breeding success in *Passer hispaniolensis* is very high reaching 95.6%. Moreover, the breeding success reported by De Laet (2001) is 88% for *Passer domesticus* and 93% for *Passer montanus*. Nevertheless, for *Passer luteus*, Ruelle (1982) obtained a low breeding success of 24 to 33% compared to hutch size.

5. Conclusion

Understanding population dynamics of Sparrows in the date palm-grove begins with the systematic identification of the main species: *Passer domesticus* × *P. hispaniolensis*. Its various biological parameters such as fertility (4.8 ± 0.9 eggs), the hatching success (4.1 ± 1.0 fledglings) and the high number of clutches equal to three per year show that this species is well adapted to climatic and dietetic conditions in the oasis of Biskra and north Algerian Sahara. Future research should focus more on quantifying the impact of mortality factors whether are climatic or biological. This is the price that the control of Sparrow populations on the farm could be considered effectively.

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