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Research Article

Spatial and Temporal Monitoring of North African Turtle Doves *Streptopelia turtur arenicola* (Hartert, EJO, 1894): First Migrants Arrive Early and Select Nesting Trees next to Foraging Resources while Second Breeders' Wave Breed around Earlier Nests

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This study aimed to evaluate the spatial microdistribution and temporal microdistribution of the North African subspecies of the globally threatened Turtle Doves in Morocco. From the end of February to early September, we monitored the migration dates, counting arrival and departure dates, and breeding chronology, to clarify if the breeding season is divided into sub-breeding phases or not. Equally, the spatial distribution of nests following potential breeding phases was surveyed weekly in Beni Mellal province following a map of a selected orange orchard. Doves arrived in Beni Mellal in the third week of March and left in mid-October, according to the results. The first nests occurred in the second week of April, followed by the first eggs in the third week of April and the first chicks in the first week of May. PCA analysis showed that the nesting and laying stages were achieved principally during the last two weeks of April and the first three weeks of May, the hatching stage between the fourth week of May and the second week of July, and fledging between the fourth week of July and the first week of September. Further, the breeding season was divided into two phases: the first breeding phase, from the first week of April to the first week of June, and the second phase, between the second week of June and the second week of August. The DCA analysis and orchard-created map indicated that the first wave of breeders colonized the marginal trees located on the orchard sides, surrounded by foraging cereals and legumes, and the second breeding-phase nests were constructed in flocks next to the nests of the first breeding phase. According to this strategy, the first breeders prospect the orchard and select nesting trees near foraging resources, while the second breeders' wave colonizes trees near successfully used prospector sites. These findings are of great importance for comparative investigations and habitat-scale conservation management.

1. Introduction

The Turtle Dove *Streptopelia turtur* (Linnaeus, 1758) is a long-distance migrant Columbidae that migrates between Europe and Asia as breeding habitats (Mars-September) and Sub-Saharan Africa as wintering grounds between October and February [1–3]. In Europe, *Streptopelia turtur* is mentioned as a breeder in Spain, France, the UK, and

Germany in the west [1, 4, 5], as well as in Turkey, Greece, and Bulgaria in the East [6, 7]. In Africa, the species is recorded in North Africa as breeding migrant [8–10], while in Sub-Sahara it is considered as winterer [2]. On the other hand, Turtle dove is the remarkable example of a European long-distance migrant bird that has suffered a rapid and severe decline across its western European range (−78% in Great Britain from 1980 to 2020 as well as −70% in the Iberian peninsula, mainly in Spain from 1980 to 2017) [11]. Therefore, it has been ranked as "Vulnerable" globally and "Near Threatened" within the Northern slope of the Mediterranean basin following recent evaluation [12, 13]. Potential causes responsible for the species" deterioration include deprivation of breeding sites [14], scarcity in food availability due to intensification of farming activities [15–17], unsustainable hunting policies [18], and variation in ecological conditions throughout the migration flyways [16, 19].

Turtle dove *Streptopelia turtur* is divided into four subspecies counting *Streptopelia turtur turtur* (Linnaeus, 1758), *Streptopelia turtur arenicola* (Hartert, EJO, 1894), *Streptopelia turtur hoggara* (Geyr von Schweppenburg, 1916), and *Streptopelia turtur rufescens* (C. L. Brehm, 1845) [20, 21]. *Streptopelia turtur turtur* is limited to Europe and western parts of Asia for breeding, while wintering grounds are located in Sub-Saharan Africa. *Streptopelia turtur arenicola* is a migrant breeder in North Africa counting Morocco, Algeria, Tunisia, and Libya, while winterers spend their time in Sub-Sahara [3, 8]. In contrast, *Streptopelia turtur hoggara* is a sedentary species and its geographical range is limited to the Southern Sahara of Algeria (Aïr Massif and Hoggar Mountains) and Libya [22]. *Streptopelia turtur rufescens* is observed in Egypt (Kharga and Dakhla oases) and in Sudan, principally in the Faiyûm area [23].

In North Africa, principally in western zones, European Turtle Doves are summer migrant and breeder birds [24, 25]. Morocco hosts an important breeding population of Doves, mainly *Streptopelia turtur arenicola* (Hartert, 1894) [8]. In Moroccan grounds, Doves are mostly dispersed in woody environments [9, 26, 27] that represent 12.7% of the national surface [28] and farmlands that represent 1.5% of the total land area of Morocco [29, 30]. They are most commonly found in farm landscapes with irrigated perimeters [17, 31, 32], with olive, orange, and apple orchards being particular favorites [17, 33].

Most studies on both European and Northwest African subspecies of Turtle Doves have focused on farmland habitats, involving reproductive biology [14, 34, 35], breeding habitat use [8, 30, 34, 41, 46], foraging habitat selection [15, 38–40], and migration [1, 8, 41, 46]. However, in forests, studies were limited to habitat use [46, 47–49] and feeding resources [41, 46]. These studies revealed variable results concerning breeding performances and clarified the main threatening factors [9, 31].

In Morocco, studies of North African Turtle Dove *S. t. arenicola* were mostly conducted in farmlands, principally olive, orange, and apple orchards [31, 33, 47]. These studies have detailed breeding biology, reproductive success, and menacing factors. However, the selection of nesting trees inside breeding orchards was neglected in Europe [41, 48] and North Africa [9, 30, 47, 49]. This element is of great importance in clarifying patterns of nesting site selection with regards to orchard characteristics, tree heights, and disturbing factors [49]. If we consider the vulnerable status and low population densities, an understanding of such elements is suggested to improve the management measures in agricultural habitats mostly colonized by this declining game species.

This study aimed to (i) map the microdistribution of nests built by North African Turtle Doves inside orange orchards, (ii) analyse breeding parameters counting chronology and success with regard to distribution in monitored orchards, and (iii) compare breeding parameters between earlier and later clutches. These elements are suggested to fill the gap concerning the zonation and nesting strategies of Turtle Doves at selected breeding sites [30].

2. Materials and Methods

2.1. Study Area. Fieldwork was conducted in the Beni Mellal-Khenifra region, located in the center of Morocco (Figure 1). The study area is dominated by various climatic stages linked to altitudinal zonation, from the plains (400 m altitude) to the mountains (up to 1000 m altitude), and this induces a spatial variability of precipitation and temperature. The rainfall regime in the mountains (northern slopes of the Middle and High Atlas) is Mediterranean with oceanic influence, with annual precipitation between 550 mm and 700 mm in Azilal and up to 1000 mm in the High Atlas. In contrast, precipitation in the Beni Mellal and Tadla plains is low (around 436 mm). Equally, temperatures vary from 1.1°C in January to 35.7°C in August. However, these climatic conditions are subject to strong interannual variability [50].

The heterogeneity of climate in Beni Mellal induces a high degree of variability in vegetation cover, water resources, and farming activities. The natural forests counting Barbary thuja *Tetraclinis articulata* ((Vahl) Mast., 1892), Thuriferous juniper *Juniperus thurifera* (Linnaeus., 1753), Phoenician juniper *Juniperus phoenicea* (Linnaeus., 1753), Aleppo pine *Pinus halepensis* (Mill., 1768), and Holm oak *Quercus ilex* (Linnaeus., 1753), cover the mountains, while the oleander *Nerium oleander* (Linnaeus., 1753), *Typha* sp., *Tamarix* sp., and Common Reed *Phragmites australis* (Trin. ex Steud., 1840) dominate the riparian vegetation. The farmlands are dominated by orchards (apples, olives, and oranges), cereals (wheat, barley, and maize), industrial crops, in particular sugar beet, and legumes (bean, Alfalfa, pea, etc.). The diversity of cultivated seeds and fruit trees is suggested to offer necessary foraging and breeding resources for the Doves.

To monitor the migratory Doves, we selected one orange grove in Abou Khayma El Bazzaza village, located in the north of Beni Mellal (Figure 1). The grove is about four hectares with 1,182 trees of Valencia late (*Citrus sinensis*), placed in lines and separated by 8 meters between trees. Cereals and legumes surround the grove from the south and east, while the west and north are limited by other orange

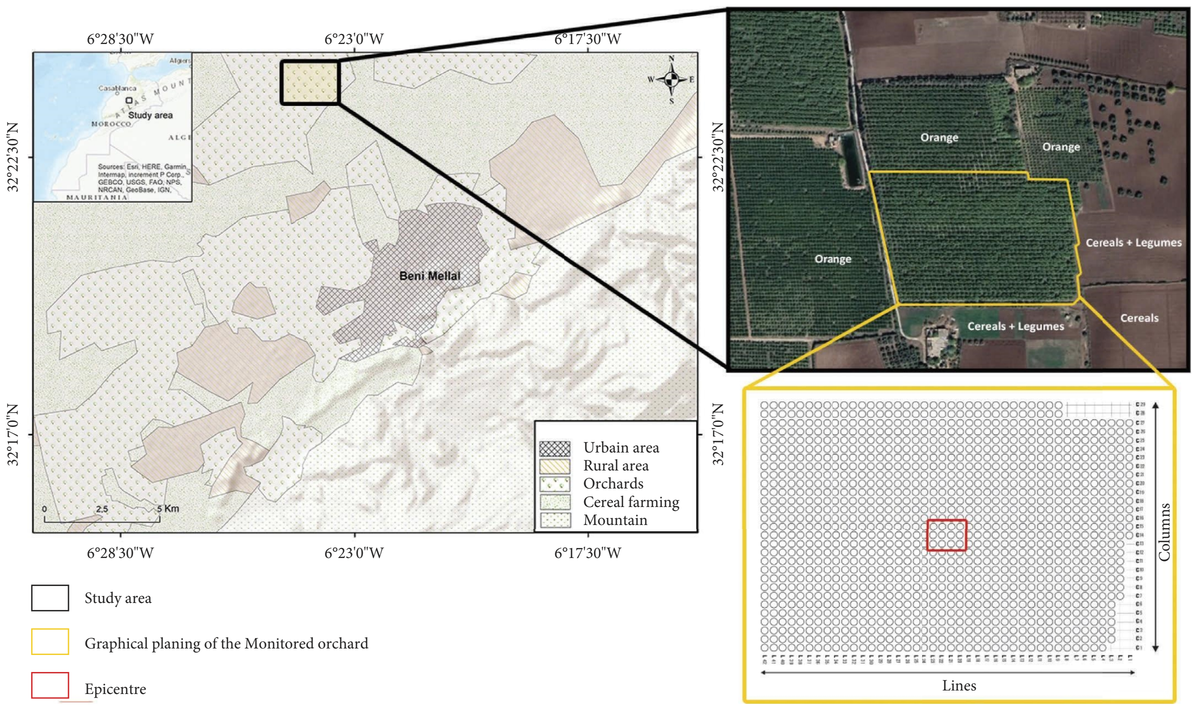

Figure 1: Location of the study area and graphical planning of the monitored orange grove.

groves. The irrigation system is installed underground, and the water is opened weekly.

2.2. Breeding Chronology. Monitoring of the area started at the beginning of March (2016), considered the date of arrival for migrant Doves in Morocco and Northwest Africa [8, 31]. We examined the dates of first arrivals to the region, and after breeding season, we noted the date where the last Doves were observed in the area (last departure dates). After the arrival of the first individuals, we conducted visits to the study orchard weekly to survey breeding activities (during the beginning of April, the orchard was visited twice to identify the first nesting attempts, while from May on, visits were reduced to once per week due to lower nesting activities). Breeding chronology, counting the construction of nests, eggs laying, hatching, and fledging of chicks, were monitored from the first week of March to the last week of September. We noted the evolution of nests, eggs, and chicks, as well as the failed ones. Failure factors were noted per visit and nest for each breeding stage.

2.3. Spatial Distribution. To evaluate the spatial distribution of breeders inside the study orchard, we noted nesting trees with specific numbers and dates. To be more accurate, we used lines and rows of citrus trees (Valencia late) as coordinates, as explained in Figure 1. For each nest found, we sanded the tree trunk and marked the nest number using sandpaper and a permanent marker. This method has helped to find the position of the nest during the ulterior visits (surveillance of nests from the construction to the success or failure of chicks) easily. We used a selfie stick to photograph the content of the nest and a piece of paper containing the plan of the orange grove to locate each nest with a symbol representing its content. Once the nest is located, it is monitored during each visit, from construction to fledging or loss of clutches. Further, we noted the distance of nests to the cereals and legumes, to the central zone of the orchard (epicenter) and to the periphery of orchards (periphery next to cereals and periphery next to other orange orchards, as clarified in Figure 1) based on the distance separating nesting-citrus-trees and the targeted zone.

2.4. Statistics. Breeding season was divided into first and second phases based on a long break in nest construction and egg-laying (hatching and fledging were neglected since the failure factors are susceptible to impacting them). Reproductive rates counting nests (occupied nests/constructed nests), eggs (hatched eggs/laid eggs), and chicks (chicks that survived/hatched chicks) were calculated for the entire season from the first nest to the last chicks and for each breeding phase. We chequered for normality and homogeneity of variance for all breeding parameters (variables) via the Kolmogorov–Smirnov test. We compared breeding success rates and failure factors (predation, desertion, destruction, and unhatched) among breeding stages (nesting, laying, hatching, and fledging) using ANOVA One way test. Further, we compared breeding parameters and failure factors between the first and second breeding phases using the T test.

To evaluate the correspondence between breeding stages, nesting (number of nests), laying (number of eggs), hatching (occurred chicks), and fledging (fledged chicks), considered as response variables, and periods-4 weeks per month (April to September), considered as factors, we used principal component analysis (PCA) (only eigenvalues >1.0 were selected).

For spatial distribution, we created the graphical planning of the orchard via Adobe Illustrator 26.0.3 (2022) software [51] (based on map extracted from Goggle Earth). Nests were placed on the nesting-trees in the graphical planning, based on data collected from the field (the lines and rows of nesting-citrus-trees were used as coordinates). However, the nests were divided into three periods: (i) first nesting wave (the first breeders to colonize the orchard after arrival dates); (ii) first breeding phase (first massive nesting stage after the colonization of breeding orchard); and (iii) second breeding phase (second massive nest construction after the long break of the first phase). However, we reinforced the graphical mapping with detrended correspondence analysis (DCA) to demonstrate statistically the distribution of nests inside the orchard as realized currently by Mansouri et al. [8] and Squalli [52] for passerine birds and Columbidae. In our case, nesting sites in orchard counting central zone (the epicenter of the orchard), periphery-orchard (the marginal zones surrounded by other orange orchards), and periphery-cereals (marginal zones surrounded by cereals and legumes (potential foraging resources)) were considered as response variables, while distances of nests (148 nests) toward central zone, periphery-orchard, periphery-cereals, and cereals were considered as dependent variables. For graphical plot, only eigenvalues superior to 1.0 and an axis with a percentage of variance >50% were selected. These methods are commonly used to assess the ecological requirements of birds, including dove species [7, 12]. All statistical analyses were executed using SPSS 18 [53], while graphs were created by GraphPad Prism 8.3.0 [54]. Results were given as percentage for success rates and sample size and as the mean ± SD for breeding parameters.

3. Results

3.1. Arrival and Departure. In Beni Mellal province, the first birds of *S. t. arenicola* were observed during the third week of March. These birds arrived solitary (single and pairs) during the last days of March, while in April, arrivals were in groups of few hundreds and mostly observed in electrical lines in the vicinity of roads principally in rural areas. After breeding season, migratory birds (adults and subadults), were gathered in foraging sites near water resources counting rivers, dams, and irrigation tunnels. The last migrants were seen at 10 October, which marked the latest departure date in the Beni Mellal area.

3.2. Chronology of Breeding Activities. Breeding chronology of *S. t. arenicola* in Beni Mellal is summarized in Figure 2. Construction of nests started during the second week of April, and nesting activities continued into the first week of August. Nesting activities were divided into the following two phases: the first phase from the first week of April to the first week of June with a peak of nesting during the second week of May, and the second phase from the second week of June to the second week of August with a peak during the third week of June. Laying of eggs started during the third week of April, and egg-putting activities sustained to the first week of August. The laying phases were divided into two phases; the first one from the second week of April to the second week of June with a peak of egg-positioning during the third week of May, and the second phase from the third week of June to the second week of August with a peak during the third week of June. The number of eggs was significantly superior during the first laying stage. The occurrence of chicks (hatching of eggs) started during the first week of May, and hatching activities sustained until the third week of August.

The hatching and fledging activities showed two peaks in the fourth week of May and the third week of June, respectively, and then fluctuations continued until the end of the breeding period. Both phases seem to be unclear in the curves, and this can be explained by modifications that occur in each nest during the incubation and rearing period, i.e., predation of eggs or broods, desertion due to disturbance, destruction of nests, etc.

Multivariate analysis (PCA) of optimum periods for breeding activities is summarized in Figure 3. Nesting and laying activities were concentrated principally during the first three weeks of May and the last two weeks of April. Hatching was concentrated between the fourth week of May and the second week of July, while fledging was mainly recorded between the fourth week of July and the first week of September. These periods marked the optimal breeding times for migrant Doves.

3.3. Spatial Distribution of Nests. The distribution of nests inside the breeding orchard is summarized in Figures 4 and 5. First nests (the first nests after prenuptial migration between second and third week of April) were placed in the periphery of the orchard surrounded by cereal farms. During the first nesting phase (after the installation of the earliest nests), breeders occupied the nesting trees without any oriented selection (nests were documented in the entire orchard). During the second phase, nests were constructed in gregarious forms next to nests of the first breeding phase. Further, three support trees used during the first phase were reoccupied during the second breeding phase.

3.4. Reproductive Rates. The total reproductive success of the North African Turtle Dove at Beni Mellal is summarized in Table 1. Among the 148 monitored nests, only 9.45% were deserted during the nesting stage. Among 134 occupied nests (eggs), 34.32% did not achieve the hatching stage. Among the 261 counted eggs, only 153 (58.62%) have succeeded to achieve the hatching stage, while 95 were predated, deserted, destructed, and unhatched. The loss rate in the fledging stage was limited; among recorded 166 chicks, 153 fledged successfully with a loss rate of 7.83%.

Failure factors were variable ($DF = 2$, $F = 33.960$, $P < 0.001$). Nest desertion caused the highest loss of *S.t. arenicola* clutches (14 nests, 42 eggs, and 8 chicks), followed by predation (35 eggs and 4 chicks), and destruction (10

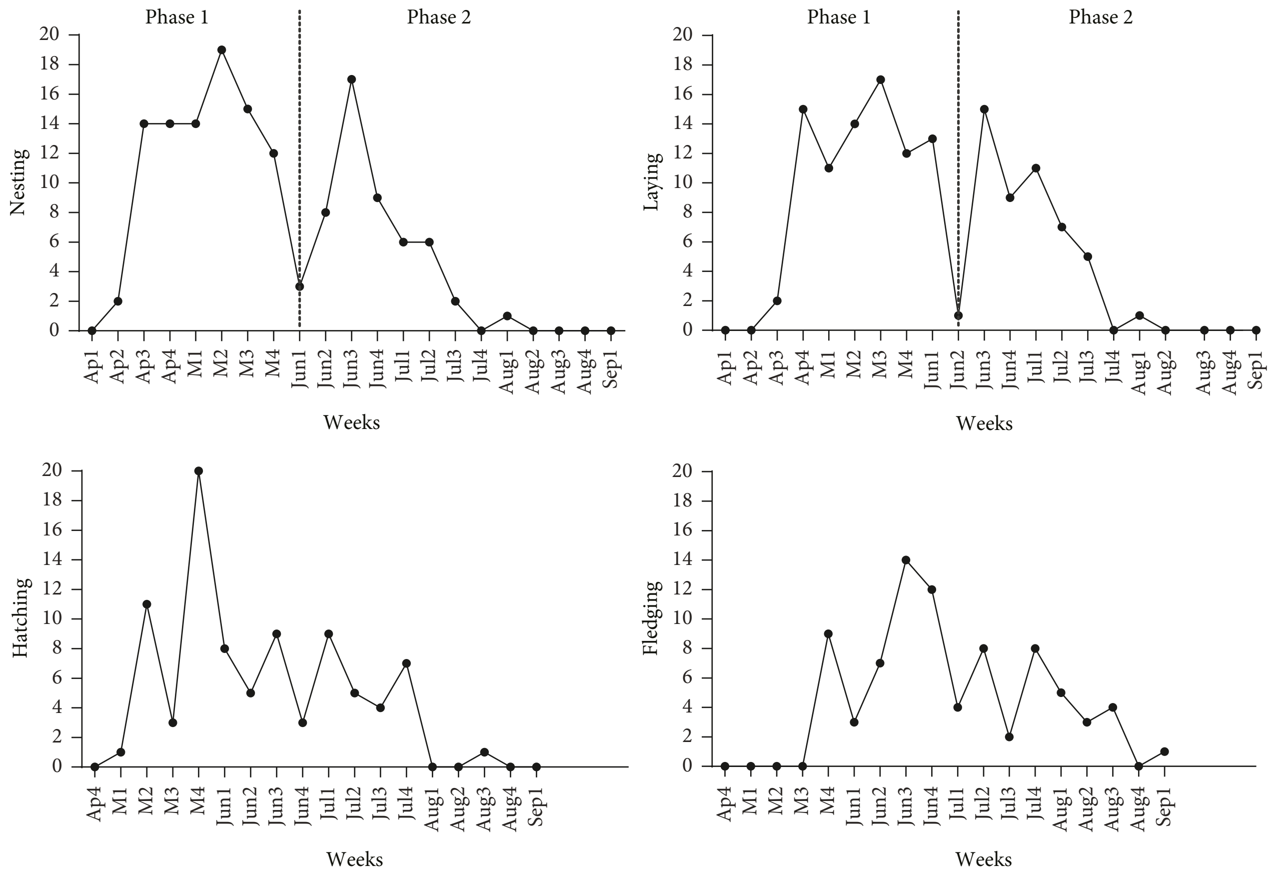

Figure 2: Breeding chronology (nesting, laying, hatching, and fledging) of *S. t arnicola* in Beni Mellal province (phase 1 and 2 are separated by a break in breeding activities during nesting and laying stages while hatching and fledging are impacted by failure factors).

eggs). Nest desertion was caused principally by anthropic activities counting, tree pruning, fruit harvesting, irrigation, pesticide use, and hunting, which were applied in coincidence with the breeding activities. The main predators observed in the monitored orchard were reptiles mostly Montpellier snake *Malpolon monspessulanus* (Hermann, 1804) and Horseshoe whip snake *Hemorrhois hippocrepis* (Linnaeus, 1758) documented on nesting-trees, as well as raptors counting, Common kestrel *Falco tinnunculus*, Peregrine falcon *Falco peregrinus*, Black-winged kite *Elanus caeruleus*, and Barn owl *Tyto alba*.

The comparison of reproductive success parameters and failure factors between breeding phases is summarized in Table 2. For breeding success, only fledging rates differed between the two breeding phases, while laying, hatching, and nesting were similar. Equally, failure factors (desertion, predation, and destruction) were similar between the first and second breeding phases.

4. Discussion

This study highlighted the temporal and spatial micro-distribution of breeding North African Turtle Doves *Streptopelia turtur arenicola* at Beni Mellal's irrigated perimeter (Morocco). Our central objectives were to provide detailed data on the chronology of breeding activities and the distribution of nests inside the breeding orchard. We obtained the first data mapping distribution of nests in an occupied orchard and the time evolution of breeding activities. These findings are of great importance for mapping zones of high breeding rates and then orienting well-adapted conservation actions to protect this threatened game in Morocco and the entire southern slope of the Mediterranean basin.

Our study documented the breeding activities of Doves, which confirms the vital importance of Beni Mellal area as a breeding and stopover area for Moroccan (breeders) and European (migrants) populations of Turtle Doves, respectively [8, 32, 46]. In our case, during spring, the first Doves were witnessed in the Beni Mellal province during the third week of March, which is in agreement with results cited by Vaurie [20] in the same zone (last decade of March). However, these dates are earlier when compared with European migratory Doves (*S. t. turtur*) observed on 25 April, in the Beni Mellal area and Moroccan breeders (*S. t. arenicola)* in high altitude zones [32]. In high altitudes, the low temperatures and high precipitations push Doves to delay their entire breeding chronology counting arrival dates to avoid the abortion of their clutches [9]. In contrast, departure dates (mid-October) were similar between Beni Mellal and other highlands in Morocco [9], in which Doves migrate on 13th October. Further, [8] recorded currently

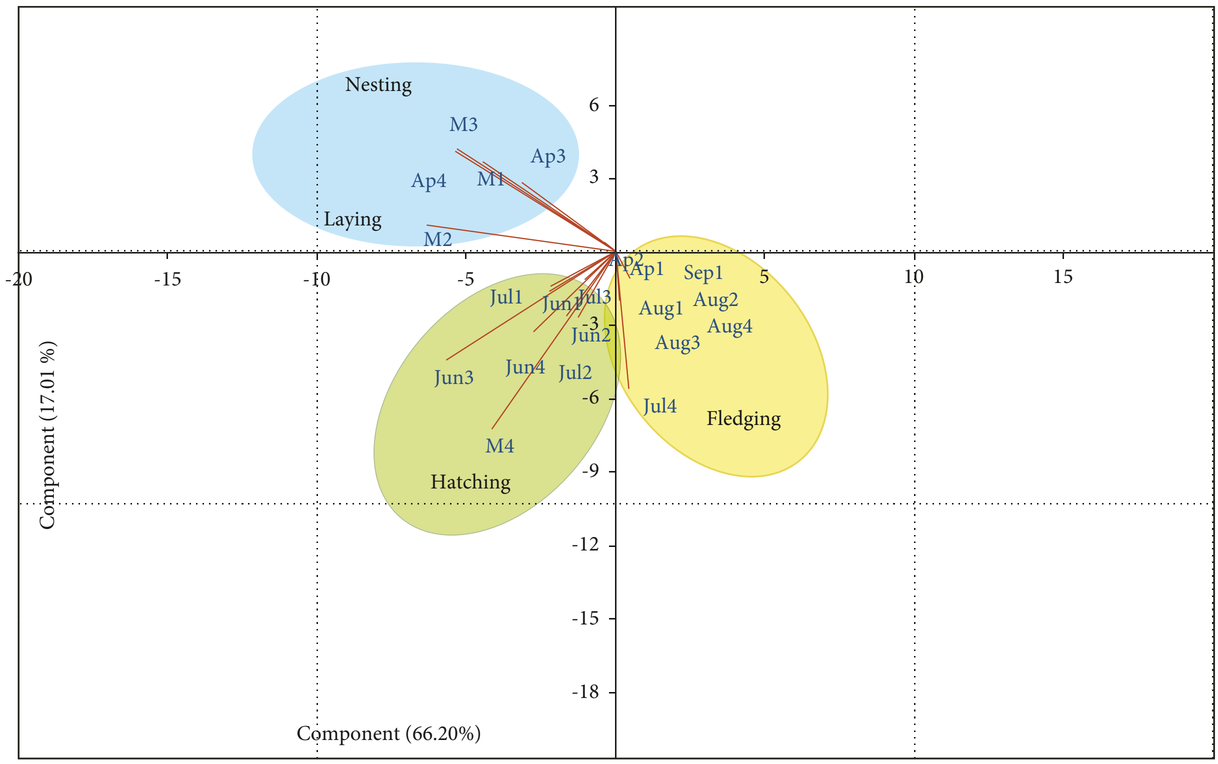

FIGURE 3: Principal breeding periods (visits by weeks) of *S. t arenicola* in Beni Mellal province analyzed with principal component analysis (PCA).

many wintering Doves in Morocco, and this is suggested to modify the phenological status of the species in entire North Africa.

Our study revealed that the breeding season of *S.t. arenicola* in Beni Mellal province is divided into earlier and tardive clutches, which is in contradiction with previous studies conducted in other Moroccan [30, 32, 33, 49] and Algerian regions [55] on the southern slope of the Mediterranean, as well as with prior studies conducted in Spain [56] and Britain [14, 34] on the European side. The abundance of cereals and other cultivated seeds around breeding orchards is strongly suggested to encourage the two breeding clutches in *S. t. arenicola* at Beni Mellal [17]. Further, in Beni Mellal, breeding activities started with the nest initiation recorded in the second week of April, followed by laying of eggs during the third week of April, hatching during first week of May, and fledging during fourth week of May. Similar results were recorded in the adjacent areas, in Tadla and Midelt which are only 30 and 180 km from Beni Mellal, respectively [9, 32]. However, these breeding dates are markedly late when compared with sublatitudinal breeding habitats in Taroudant located 400 km to the South of Morocco [33], where breeding activities started in March, and earlier when compared with Northern breeding habitats in Spain [56] and Britain [34] where breeding season starts in mid-April. These differences may indicate a suggested effect of latitudinal gradient as recorded in many Western Palearctic birds counting the European Turtle doves *Streptopelia turtur turtur* that take nearly 17 days between North African stopovers (as low latitudinal limits) and European breeding grounds (as higher latitudinal limits in the Northern hemisphere) [41, 41]. However, more investigations are needed to confirm this issue.

This study highlighted the distribution of nests inside breeding orchards, which is the first of its kind. First nesting sites were selected in marginal trees placed near cereals and other cultivated seeds, and this indicates the crucial role of foraging resources in the selection of breeding sites and habitats [9, 17]. The selection of breeding trees near foraging seeds is suggested to support breeding pairs and their nestlings during the breeding season as mentioned currently by Mansouri et al. [9]. Nests of the second breeding phase were constructed in gregarious forms and nesting trees were selected next to nests of the first breeding phase. As a potential explanation, we suggest that the first breeders prospect the selected orchards for the security of nests and availability of forage via their earlier nests, while during the second wave of breeders (second breeding phase), Doves nest intensively near the trees selected by the prospectors (first wave of breeding phase) based on the security and food availability offered for first nests. However, this issue needs a specific investigation, and its results are suggested to classify nesting-nucleus where the density of nests is higher as the case of many gregarious and social birds counting greater flamingos (*Phoenicopterus roseus*) [57, 58] and the Eurasian Coot *Fulica atra* [59] that colonise secure sites and other nesting sites of lower density.

According to our annual breeding success evaluation, the breeding success rates of Turtle doves at Beni Mellal province were medium during all breeding phases. In total,

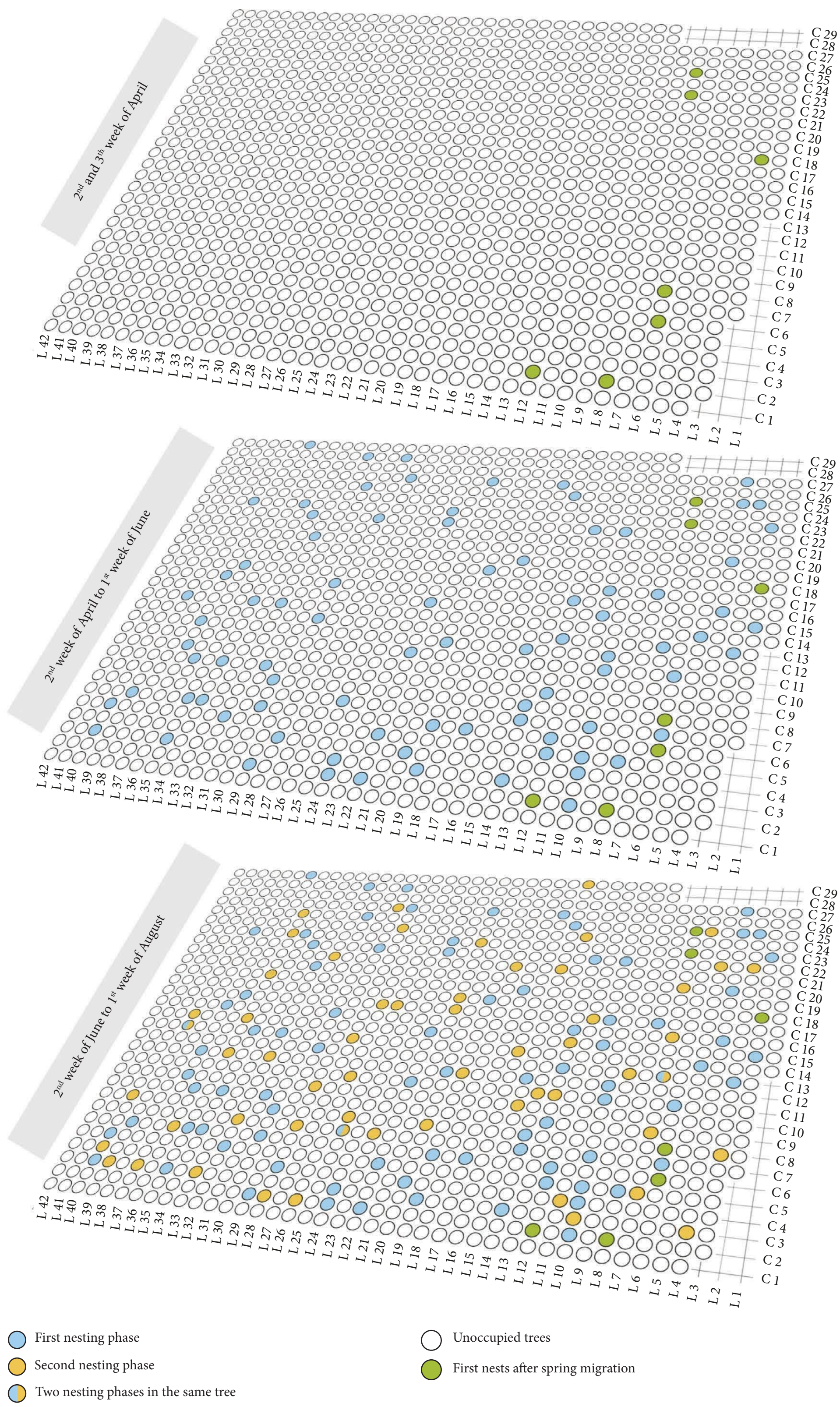

Figure 4: Spatial distribution of nests inside breeding orchard following breeding phases (first nests after spring migration: nest of first Dove breeders, first breeding season: nests recorded before the first break of breeding activities, and second breeding phase: nests recorded after break of breeding activities).

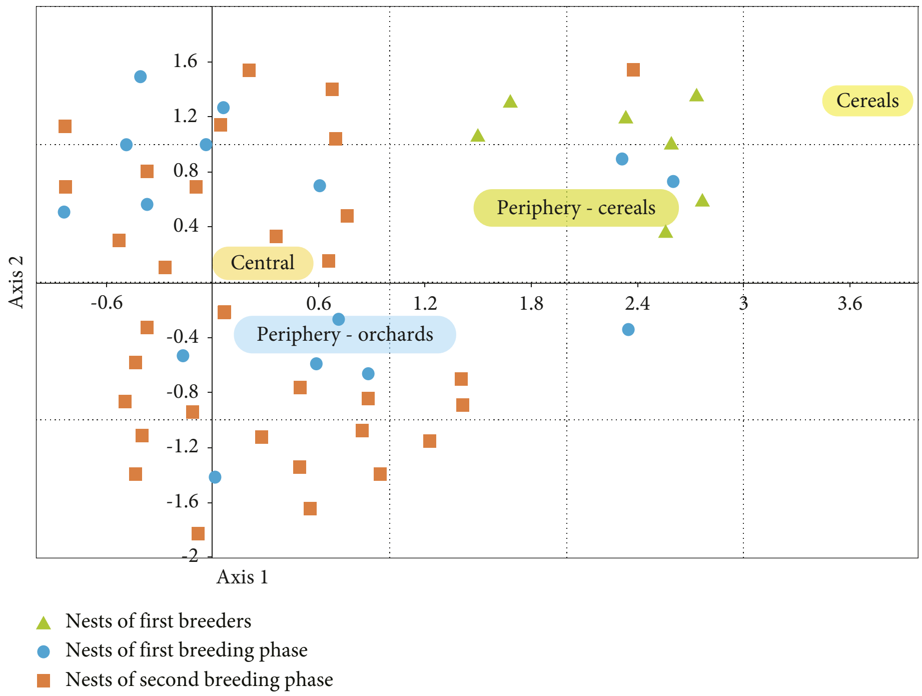

Figure 5: Detrended correspondence analysis of breeding sites (central zone: the epicenter of the orchard, periphery-orchards: marginal zone surrounded by other orchards, periphery-cereals: marginal zone surrounded by cereals, cereals: nearest cereal farms) selected inside breeding orchard by first breeders, first breeding season, and second breeding phase.

Table 1: Breeding success and failure factors of *S. t. arenicola* in Beni Mellal province.

Breeding stages	Parameter	Orange grove Number	%
Nests	Total	148	100
	Succeeded	134	90.55
	Deserted	14	9.45
Eggs	Total	261	100
	Succeeded	166	63.60
	Predated	35	13.40
	Deserted	42	16.09
	Destructed	10	3.83
	Unhatched	8	3.06
Chicks	Total	166	100
	Succeeded	153	92.16
	Predated	4	2.4
	Died	1	0.6
	Deserted	8	4.82

Table 2: Comparison of breeding parameters, reproductive rates, and failure factors between breeding phases in *S.t. arenicola* at Beni Mellal province.

		Phase II	Phase I	*t*	Df	*P* value
Breeding stage						
Nesting	Nests	93	55	−1.385	11	0.193
Laying	Eggs	165	96	1.050	10	0.318
Hatching	Chicks	89	77	0.971	11	0.353
Fledging	Subadults	30	129	−3.052	11	0.011
Failure factors						
	Desertion	11	17	−1.340	11	0.207
	Predation	6	1	1.332	11	0.210
	Destruction	5	8	−1.292	11	0.223

92.17% of chicks have survived from nesting to fledging. These results are highly close to those cited in apple orchards at Midelt [32], in olives at Taroudant [33], and in palms at Biskra in Algeria [60]. Despite the availability of food resources around orchard and water inside it, Turtle dove clutches were regularly disturbed. In our case, failure factors were variable. Predation, nest abandonment, and non-hatching presented the most threats menacing Turtle Dove's breeding success. They have caused the loss of 95 of eggs and 14 of nests which is similar to the results cited in Tadla [61] and Midelt [31], in which predation, human impacts, and abortion caused failures in breeding doves. The main predators observed in our case were reptiles (Montpellier snake and horseshoe whip snake and raptors (Common kestrel *Falco tinnunculus*, Peregrine falcon *Falco peregrinus*, Black-winged kite *Elanus caeruleus*, and Barn owl *Tyto alba*). The human disturbance, counting tree cutting, irrigation, and pesticide use were applied coincidentally with Doves breeding activities, which forced this vulnerable species to desert many nests. Generally, these menaces were cited in other Moroccan farmlands, including olives, apples, and oranges [9, 32, 33, 62].

5. Conclusion

This study offers new data on the temporal and spatial distribution of the North African Turtle dove subspecies (*S. t. arenicola*) in Morocco and the Western Palearctic flyway. In summary, first breeders arrived early to nesting sites and the breeding season was divided into the first phase from the first week of April to the first week of June (earlier), and the second breeding phase between the second week of June and the second week of August. The first breeders prospect breeding orchards and select nesting trees close to foraging resources, while during the second breeding phase nests were selected in gregarious forms close to those of the first phase. However, despite the abundance of foraging resources and breeding requirements, breeding success was lower due to human disturbance, natural enemies, and abortion of eggs. These data are of great importance for comparative research concerning the microdistribution of the vulnerable Doves in breeding sites, as well as for conservation actions at orchard-scale via the reduction of human activities in most populated areas of breeding groves. Further, the installation of the second breeding phase between June and September needs more investigations, principally the impact of hunting activities from July to September, on breeders that realize sorties between nests and foraging habitats.

Data Availability

The data used to support the findings of this study are included in the article.

Conflicts of Interest

The authors declare they have no conflicts of interests.

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