

The nest-site characteristics of the forest population of common blackbird (*Turdus merula*) in Eskişehir, Turkey

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Abstract: Nest-site characteristics and nest-site selection in a forest population of common blackbird was investigated in an area of 200 ha in Eskişehir's Meşelik black pine forest during the spring of 2013. Within this framework, 36 nests were found in total: 31 of them were new and the rest (N = 5) were old. The nest-site characteristic parameters were measured in centimeters and nest tree species were recorded. According to the results, it was concluded that all of the nests were made on the stem of the nest tree at the widest part of the tree. Common blackbirds in the study area chose juniper to nest in most frequently, with 66.7% of the total. The density of the blackbird territory in the area was found to be 1.27 ha/nest. The mean \pm SD distance between the nests was measured as 30.52 ± 7.5 m. In light of these findings, when the study results were analyzed, it was stipulated that common blackbirds in the investigation area have similar nest-site characteristics.

Key words: Blackbird, *Turdus merula*, nest-site characteristics, nest-site selection, Eskişehir, Turkey

1. Introduction

A great number of studies have been conducted to date in order to determine the nest-site characteristics and selection of bird species (Caccamise, 1977; McCrimmon, 1978; Hayward and Escano, 1989; Moskat and Honza, 2000; Mero et al., 2010). Nest-site characteristics and selection have been proven to be effective on some behaviors of the species, such as competition between species (McCrimmon, 1978), breeding success (Caccamise, 1977; Hatchwell et al., 1996; Stokes and Boersma, 1998), nest density (Wysocki et al., 2004; Mero et al., 2010), predation (Wysocki, 2005), dispersion, and habitat use (Lovász et al., 2000). Habitat features and nest-site characteristics play a determining role in nest-site selection (Sedgwick and Knopf, 1990; Wysocki, 2005).

The populations of common blackbird (*Turdus merula*) in urban habitats and forests differ from one another in terms of genetics, breeding, characteristics, and ecological features (Snow, 1958; Batten, 1974; Luniak and Mulsow, 1988; Partecke et al., 2004; Wysocki, 2004b; Partecke et al., 2006). In the same vein, studies revealed that park populations have a higher rate of breeding success than forest populations, together with different types of nest-site selection and unique nest-site characteristics (Lovász et al., 2000; Wysocki, 2005).

The common blackbird population in Europe, in contrast to its population in Turkey (Kızıroğlu, 2009; Karakaya, 2009), generally shows a tendency toward urbanization (Faivre et al., 2001; Partecke et al., 2006). It is also probable that the local species in Turkey (Kızıroğlu, 2008) has different characteristics inland (Karakaya, 2009). Common blackbird has cup-shaped nests; generally, the forest population makes these nests in trees of shrub form. Nest tree species vary across areas. It has been determined that nest-site characteristics in urban populations also differ from one another (Wysocki, 2005).

This study aimed to investigate whether common blackbirds in forest populations have distinct nest-site characteristics and selection.

2. Materials and methods

2.1. Study area

The area of investigation was selected as Meşelik Forest (39°44'48.32"N, 30°29'13.72"E), 3 km away from the Eskişehir city center, at an average of 850 m a.s.l. The studies were conducted in an area of 200 ha in the forest. Meşelik is a plantation forest, and there is no economic activity being carried out. The forest is composed of 96% black pine (*Pinus nigra*) and 3% tree species in shrub form from the families of oak (*Quercus* spp.), spruce (*Picea*

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spp.), juniper (*Juniperus* spp.), and Rosaceae (Rosaceae spp.). The rest, a total of 1%, consists of exposed terrain. The average vegetation height is 6 m. The forest is situated in an area with a continental climate, and it solely has intermittent streams.

2.2. Methods

A nest-site study was conducted in Meşelik Forest during the 2013 breeding season. During this period, new and old nests made by common blackbird were identified and their coordinates were recorded. The nest-site characteristic parameters such as the height of the nest measured from the ground level (Nh), its distance to the tree stem (No), its distance to the widest part of the tree (Ny), the shortest distance of the nest to the periphery (Nx), the distance between nests (Nd), the height of the nest tree (Th), the widest part of the tree (TW), and nest-tree species were recorded (Figure 1).

To determine whether common blackbird had differences in the selection of tree species to nest, a chi-square test was used; to examine whether there was a meaningful relationship between nest parameters, Pearson's correlation test was applied one-by-one between the parameters; and to determine whether nest height and other parameters differed from each other, an independent sample t-test was applied.

The data obtained were analyzed statistically, and linear regression among the height of the nest plant, height of the nests, width of the nest plant, and shortest distance of the nest to the periphery were determined. Afterwards, the nests were gathered, given numbers, and sent to be kept in the museum of the Hacettepe University Environmental Education Bird Research and Ringing Center.

3. Results

All the nests were situated in the direction of Meşelik Forest's provincial border in the black pine forest and

within the same habitat. Despite the fact that the dominant tree species in Meşelik Forest was black pine, 34 out of 36 nests were made in other tree species (Table 1). In terms of nest selection, common blackbirds more often chose juniper species as a nesting place compared to other types of tree ($\chi^2 = 4.000$, $df = 1$, $P < 0.05$).

The ratio of the mean height of nest tree (Th) to the vegetation height (6 m) was 1/3. The 2 highest nest trees were black pine (Th1 = 850 cm, Th2 = 650 cm). Both of these nests showed deviation from the average values (Th (\bar{x}) = 251.36 cm). The lowest nest (Nh = 43 cm) was made in a juniper tree, whereas the highest nest (Nh = 360 cm) was made in a black pine. The nest at the highest level showed deviation from the average values (Nh (\bar{x}) = 116 cm). For all the nests listed, parameter ratios were within the range of Th/Nh = 1.5–2.69, and $\Sigma Th/\Sigma Nh$ was 2.15. All of the nests (N = 36) were made adjacent to the nest tree stem (No = 0) and on the widest part of the nest tree (Ny = 0).

The ratio of TW/Nh was between 1 and 1.73, and $\Sigma TW/\Sigma Nh$ was 1.34. The widest tree species was recorded as black pine (TW max. = 390 cm), whereas the narrowest tree species was spruce (TW min. = 93 cm). All of the individuals used the shortest distance of the nest to the periphery (Nx) in order to reach their nests. Nx value was below the Nh and TW values in all nests, and approximately within the ratio of 1/3. According to the dataset, the Nx value of the nest situated on the widest part (TW = 390 cm) was similar to the others and close to the average. There was similarity between old and new nests in terms of nest characteristic parameters (Table 2).

According to Pearson's coefficient of correlation, there was a significant relationship among Nh, Th, and TW parameters ($P < 0.01$). Nx was found in almost all nests in approximate values. A statistical relationship could not be determined between Nx and the other parameters (Table 3).

There was a positive linear relationship between Nh and Th ($B = 0.401$; $t = 13.392$; $P < 0.000$) and between TW and Th ($B = 0.317$; $t = 6.026$; $P < 0.000$). It was not possible to determine any linear relationship between each of the 3 parameters and Nx.

Table 1. Nest tree species used as nest sites by common blackbird.

Species	Frequency	Percentage
<i>Pinus nigra</i>	2	5.6
<i>Juniperus</i> sp.	24	66.7
<i>Picea</i> sp.	8	22.2
<i>Quercus</i> sp.	2	5.6
Total	36	100.0%

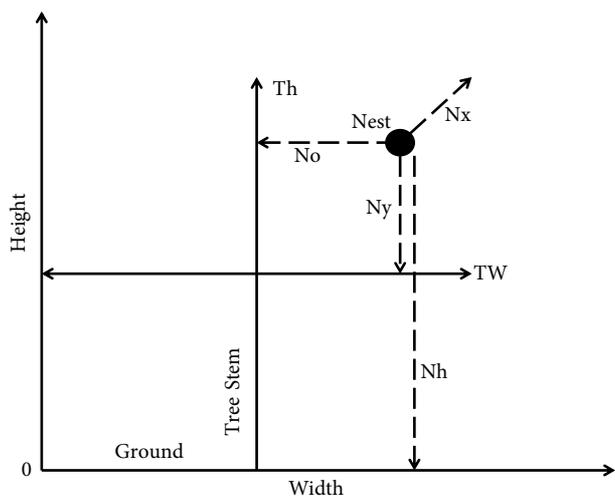


Figure 1. Nest-site characteristics diagram.

Table 2. The statistical data results of the nest characteristic parameters and mean value of old nests.

Parameters (N = 36)	Unit	Mean (\bar{x})	Std. error of mean	Median	Min.	Max.	Mean value (\bar{x}) of old nests (N = 5)
Th	cm	251.36	23.53	220.00	110.00	850.00	293.20
TW	cm	156.86	10.38	140.00	93.00	390.00	139.60
Nh	cm	116.47	10.29	98.00	43.00	340.00	121.80
Nx	cm	32.63	2.98	30.00	10.00	105.00	42.00
No	cm	.00	.00	.00	.00	.00	.00
Ny	cm	.00	.00	.00	.00	.00	.00
Nd	m	30.52	7.56	21.00	5.00	274.00	27.00

Table 3. Correlation coefficients between nest-site characteristic parameters.

Parameters (N = 36)		Th	Nh	TW	Nx
Th	Pearson correlation	1	0.917**	0.719**	0.163
	Sig. (2-tailed)		0.000	0.000	0.341
Nh	Pearson correlation	0.917**	1	0.674**	0.075
	Sig. (2-tailed)	0.000		0.000	0.665
TW	Pearson correlation	0.719**	0.674**	1	0.092
	Sig. (2-tailed)	0.000	0.000		0.594
Nx	Pearson correlation	0.163	0.075	0.092	1
	Sig. (2-tailed)	0.341	0.665	0.594	

** : Correlation is significant at the 0.01 level (2-tailed).

Nx had the lowest standard error with similar values in nearly all the nests. Additionally, it was speculated that nest parameters were not affected by nest tree species. It was very clear that all the nests, with the exception of one, were situated on similar parts of the trees. It was also proposed that pairs in the population bred in areas at proportionately equal rates (Figure 2).

According to the results, it was stipulated that the common blackbird population showed dispersion in an area of 46 ha out of the whole investigation area of 200 ha. This is the area closest to the city center.

In addition, 3 intermittent streams pass through the area, and within the forestry area there are a great number of clearings. Concordantly, this area is situated within the closest locality to the Porsuk streamlet. This area is like a recreation site for various bird species, especially during the migration period, because of irrigated farming. Within the scope of the data analysis, it was concluded that the area in which the common blackbird population showed dispersion was situated closest to the forest, an urban area, and agricultural land. With the exception of merely one nest (Nd max. = 274 m), most of the nests were close to

each other, and distant from one another at an average of 30.5 m. The nest density in the investigation area was 1.27 ha/nest.

According to the data gathered, it was determined that common blackbird made nests in nutritionally rich areas at the border of 3 different habitats, but all were within forested areas.

It was also seen that trees in shrub form were preferred primarily by common blackbird instead of tall trees in the forest. The reason behind this preference was that those were the trees (e.g., *Juniperus* sp.) that were difficult to reach or access by hunters in the forest. In terms of the selection process, they preferred trees compatible with the ratios of {Ny = 0, No = 0, Th/Nh \approx 2, and Nh \leq TW} to nest in. The results of the study indicated that as members of the Meşelik Forest common blackbird population, pairs made their nests in distinct areas on the trees. All the nests in the population had similar nest-site characteristics.

4. Discussion

The most significant conclusion of this study was that the common blackbird population living in Eskişehir

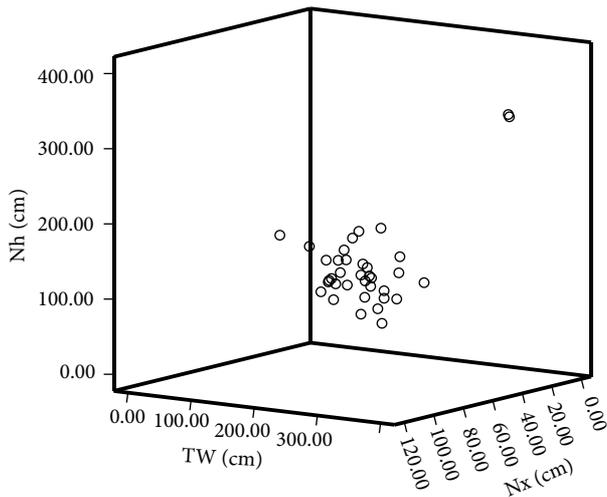


Figure 2. The dispersion of Nh, TW, and Nx ratios on a 3-dimensional (x–y–z) plane.

Meşelik Forest performed nest-site selection on the nest tree according to some particular ratios. Within the scope of the studies conducted upon species-specific park and urban populations (Faivre et al., 2001; Wysocki, 2005), it has been noted that nests were made in high trees rather than shrubs. However, the subject of this study, the forest population, made nests on shrubs, in contrast with park and urban populations. It was not mentioned in other studies whether nests were situated on the widest part of the tree. All the nests of the study population were made adjacent to the stem of the trees, just like the ones made by park and urban populations (Wysocki, 2005; Karakaya, 2009). The nest heights of the forest population were lower than those of almost all results from other studies (Glutz von Blotzheim et al., 1982; Pikula and Beklova, 1983; Ludvig et al., 1995; Gregoire et al., 2003; Wysocki, 2005). However, the results showed some similarities with the results revealed

References

- Batten LA (1974). Blackbird boom in suburbia. *Wildlife* 6: 274–277.
- Bauer HG, Berthold P (1997). *Die Brutvögel Mitteleuropas: Bestand und Gefährdung*. 2. Auflage. Wiesbaden, Germany: Aula-Verlag (in German).
- Caccamise DF (1977). Breeding success and nest site characteristics of the red-winged blackbird. *Wilson Bulletin* 89: 396–403.
- Faivre B, Préault M, Théry M, Secondi J, Patris B, Cézilly F (2001). Breeding strategy and morphological characters in an urban population of blackbirds, *Turdus merula*. *Anim Behav* 61: 969–974.
- Glutz von Blotzheim UN, Bauer K, Bezzel E (1982). *Handbuch der Vögel Mitteleuropas*. Frankfurt am Main, Germany: Akademische Verlagsgesellschaft (in German).
- Gregoire A, Garnier S, Dreano N, Faivre B (2003). Nest predation in blackbirds (*Turdus merula*) and the influence of nest characteristics. *Ornis Fennica* 80: 1–10.
- Hatchwell BJ, Chamberlain DE, Perrins MC (1996). The reproductive success of blackbirds *Turdus merula* in relation to habitat structure and choice of nest site. *Ibis* 138: 256–262.
- Hayward GD, Escano RE (1989). Goshawk nest-site characteristics in western Montana and northern Idaho. *Condor* 91: 476–479.
- Karakaya M (2009). Eskişehir ormanlarında yaşayan karatavukların *Turdus merula* biyo-etolojisi. PhD, Eskişehir Osmangazi University, Eskişehir, Turkey (in Turkish).
- Kiziroğlu İ (2008). Türkiye Kuşları Kırmızı Listesi. Ankara, Turkey: Desen Print (in Turkish).

by the study of Vogrin (2000). Within the framework of studies in which common blackbird ecology and nest-site characteristics have been analyzed to date, no dataset probing the relationship between tree width and nest-site has been encountered. The pairs in the Meşelik Forest population made their nests on the widest part of the trees.

In parallel with some other studies, it was concluded that the common blackbird forest population most commonly preferred conifer forests (Snow, 1958; Glutz von Blotzheim et al., 1982; Moller, 1988; Bauer and Berthold, 1997). Due to the fact that the investigation area was restricted and the nest density was high, the species had some common behavioral features, or they might have a close degree of affinity. This theory could be backed up with the fact that pairs in the aforementioned forest population had similar nest characteristics. This study also reveals the behavioral and genetic differences between the forest and urban populations for common blackbird, which are often associated with different ecological factors in a variety of environments (Partecke et al., 2004; Partecke et al., 2006). Some of the common blackbird populations found in Turkey shows seasonal migration inside the country, but others do not migrate during the winter (Kiziroğlu, 2008). It appears that the members of the common blackbird population investigated during this study spend the winter in their own areas on shrubs rather than trees.

For further studies, the analysis of genotypes and behavioral features of the common blackbird population that is the subject of this study is recommended, thereby asserting the degrees of affinity, which is certain to contribute to an explanation and clear definition of the similarities between individuals' selection of nest-sites and nest trees.

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- Kızıroğlu İ (2009). Türkiye Kuşları Cep Kitabı. Ankara: Ankamat Matbası (in Turkish).
- Lovász P, Bártol I, Moskát C (2000). Nest-site selection and breeding success of the lesser grey shrike (*Lanius minor*) in Hungary. Ring 22: 157–164.
- Ludvig E, Vanicsek L, Török J, Csörgö T (1995). The effect of nest-height on the seasonal pattern of breeding success in blackbirds *Turdus merula*. Ardea 83: 411–418.
- Luniak M, Mulsow R (1988). Ecological parameters in urbanization of the European blackbird. In: Ouellet H, editor. Acta XIX Congressus Internationalis Ornithologici. Ottawa, Canada: University of Ottawa Press, pp. 1787–1793.
- McCrimmon DA Jr (1978). Nest site characteristics among five species of herons on the North Carolina coast. Auk 95: 267–280.
- Mero TO, Zuljevic A, Varga K (2010). Nest-site characteristics and breeding density of Magpie *Pica pica* in Sombor (NW Serbia). Acrocephalus 31: 93–99.
- Moller AP (1988). Nest predation and nest site choice in passerine birds in habitat patches of different size: a study of magpies and blackbirds. Oikos 53: 215–221.
- Moskat C, Honza M (2000). Effect of nest and nest site characteristics on the risk of cuckoo *Cuculus canorus* parasitism in the great reed warbler *Acrocephalus arundinaceus*. Ecography 23: 335–341.
- Partecke J, Gwinner E, Bensch S (2006). Is urbanisation of European blackbirds (*Turdus merula*) associated with genetic differentiation? J Ornithol 147: 549–552.
- Partecke J, Van't Hof T, Gwinner E (2004). Differences in the timing of reproduction between urban and forest European blackbirds (*Turdus merula*): result of phenotypic flexibility or genetic differences? P R Soc B 271: 1995–2001.
- Pikula J, Beklova M (1983). Nidobiology of *Turdus merula*. Acta Sc Nat Brno 17: 1–46.
- Sedgwick JA, Knopf FL (1990). Habitat relationships and nest site characteristics of cavity-nesting birds in cottonwood floodplains. J Wildlife Manage 54: 112–124.
- Snow DW (1958). A Study of Blackbirds. London, UK: British Museum.
- Stokes DL, Boersma PD (1998). Nest-site characteristics and reproductive success in magellanic penguins (*Spheniscus magellanicus*). Auk 115: 34–49.
- Vogrin M (2000). Nest height and nesting losses of rural and urban blackbirds *Turdus merula*. Ornis Svecica 10: 149–154.
- Wysocki D (2004a). Age structure of an urban population of blackbirds (*Turdus merula*) in Szczecin (NW Poland). Zoologica Poloniae 49: 219–227.
- Wysocki D (2004b). Alternative mating strategies in an urban population of European blackbird (*Turdus merula*) in Szczecin (NW Poland). Ardea 92: 103–107.
- Wysocki D (2005). Nest site selection in the urban population of blackbirds *Turdus merula* of Szczecin (NW Poland). Acta Ornithol 40: 61–69.
- Wysocki D, Adamowicz J, Kościów R, Śmietana P (2004). Breeding territory in an urban population of European blackbird *Turdus merula*. Ornis Fennica 81: 1–12.