

## NEST-SUPPORTING TREES USED BY TURTLE DOVE (*STREPTOPELIA TURTUR*) IN THE SAKAR MOUNTAINS, SOUTHEAST BULGARIA

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### Abstract

Thirty-seven nests of Turtle Doves were found in the Sakar Mountains in 2014–2016. The average height of their situation was  $5.3 \pm 1.8$  (2.1–10) m. The average height of the trees-substrates was  $7.9 \pm 2.5$  (3–12) m. The earliest nesting was observed at the beginning of May. First laid eggs were found in the second half of May. Groups of flying juvenile Turtle Doves appeared in early June to the end of the research period. The first nests were observed on 01.05., eggs – on 21.05., and well-flying juveniles on 04.06. The largest number of nests was found in Oak (*Quercus* spp.) forests ( $n=12$ ) and Austrian Pine (*Pinus nigra*) plantations ( $n=9$ ). Breeding in small villages of the turtle dove in Bulgaria was established.

**Key words:** nest locations, nest height, nesting habitats, columbiform birds, Sakar Mountain.

### Introduction

Turtle Dove (*Streptopelia turtur* Linnaeus, 1758) is a widespread migrant breeder in Central and Southern Europe, Asia, Middle East and North Africa (Baptista et al. 2015). The population declines in Europe and Turtle Dove is included in the Red List of IUCN as vulnerable species (IUCN 2017).

Turtle Dove is widely spread in Bulgaria, most often up to about 1200 m s.l. (Simeonov et al. 1990). Its density is unevenly, and reaches its highest in loose forests or mosaics of trees and shrubs adjacent to open areas. The trends of distribution and population size, according to last ornithological studies, are probably stable

(Stoychev and Mitev 2007). Until the end of the 20<sup>th</sup> century, the Turtle Dove was a common breeding species in the plains of Bulgaria (Simeonov et al. 1990, Nankinov 1994). However, some data indicate its decline between 1970 and 1990 (Stoychev and Mitev 2007).

The purpose of this study is to present data on the nesting of the Turtle Dove in the Sakar Mountain, as well as nest distribution, habitats, height, and brood size.

### Material and Methods

The researched area is a part of MG-14, 10 km-square of the Universal Transverse Mercator grid (Fig. 1). It falls within the

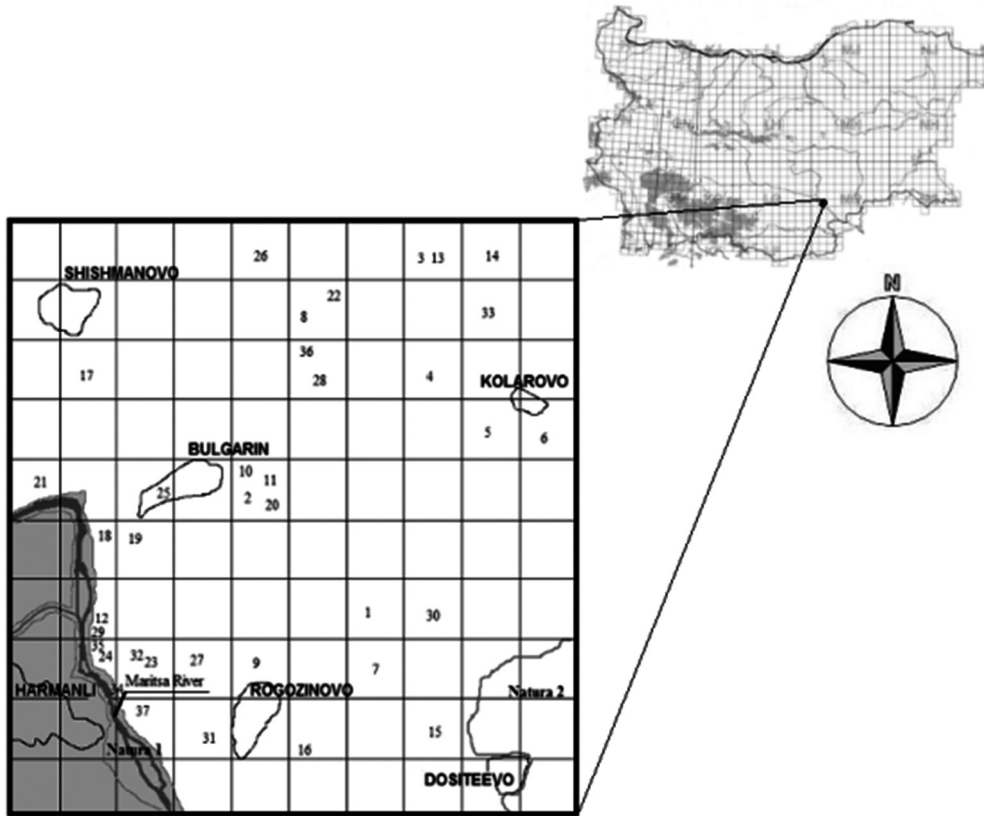


Fig. 1. Study area and nest location in MG 14 UTM.

Note: The numbers show the location of found nests, their number are the numbers of the nests in Table 1. Natura 1 – Nature zone Reka Maritsa BG 0000578; Natura 2 – Nature zone Radinchevo BG 0002020. Gray squares are outside the surveyed territory.

boundaries of the Sakar Mountain, where mixed Oak forests predominate. Large forest massifs are preserved only in the high parts of the mountain. Forests are fragmented into separate spots within the studied area. Plantations of Austrian Pine (*Pinus nigra* Arnold) and Cedar (*Cedrus* sp.) have been created in many places. A large part of the area is occupied by arable land and vineyards divided by many narrow stripes of deciduous trees and shrubs. Separate scattered spots with Jerusalem thorn (*Paliurus spina-christi* Miller) with single trees occur throughout

the researched area. Numerous small artificial ponds determine the presence of wetlands, as from the west the territory is limited by the Maritsa River (Natura 2000 – Reka Maritsa BG 0000578).

Within 2014–2016, each 1 km square was visited 7 times a year: 18.04–24.08.2014; 15.04–03.08.2015 and 23.04–20.08.2016. Potential nesting sites were searched around the observations of singing Turtle Doves. Each found nest was determined according to: its height; the height of the tree; tree species; number of eggs, when possible. Tree heights and

distances from the base of the stem to the lowest part of each found nest were measured with altimeter "SUUNTO-PM 5/1520". The number of eggs was determined when there was visibility of the nest, viewed from below (the Columbiform nests are made of thin layer of twigs and often the eggs are visible (Simeonov et al. 1990)).

During the study, 16 crops of adult Turtle Doves were analysed: 2014 – 7; 2015

– 5; 2016 – 4. They were collected during hunting trips for hunting associations for the surveyed territory.

## Results

A total of thirty-seven nests were detected and observed (9 in 2014; 18 in 2015 and 10 in 2016) (Table 1, Fig. 1).

**Table 1. Nest distribution by plant species, nest height and height of tree/shrub by data 2014–2016.**

| No | Species of tree/shrub               | Nest height, m | Plant species height, m | Data       | Eggs, number |
|----|-------------------------------------|----------------|-------------------------|------------|--------------|
| 1  | <i>Quercus cerris</i> L.            | unind.         | 12                      | 02.05.2014 | unind.       |
| 2  | <i>Quercus cerris</i> L.            | unind.         | 10                      | 23.05.2014 | 2            |
| 3  | <i>Pinus nigra</i> Arn.             | 6.5            | 9                       | 23.05.2014 | 2            |
| 4  | <i>Quercus cerris</i> L.            | 6              | 9                       | 23.05.2014 | unind.       |
| 5  | <i>Ulmus minor</i> Mill.            | 4.5            | 6                       | 24.05.2014 | unind.       |
| 6  | <i>Acer negundo</i> L.              | 6              | 11                      | 24.05.2014 | 2            |
| 7  | <i>Pinus nigra</i> Arnold           | 8.5            | 11                      | 26.05.2014 | unind.       |
| 8  | <i>Quercus pubescens</i> Willd.     | 6.5            | 8                       | 14.07.2014 | 1            |
| 9  | <i>Paliurus spina-christi</i> Mill. | 2.8            | 3.1                     | 18.07.2014 | 2            |
| 10 | <i>Salix fragilis</i> L.            | 4.5            | 6                       | 06.05.2015 | 0            |
| 11 | <i>Quercus pubescens</i> Willd.     | 6.3            | 9                       | 06.05.2015 | 0            |
| 12 | <i>Robinia pseudoacacia</i> L.      | 4.5            | 9                       | 21.05.2015 | 1            |
| 13 | <i>Pinus nigra</i> Arn.             | 8              | 10                      | 21.05.2015 | 2            |
| 14 | <i>Quercus pubescens</i> Willd.     | 4              | 5.5                     | 23.05.2015 | unind.       |
| 15 | <i>Pyrus</i> L. sp.                 | 3.2            | 4                       | 26.05.2015 | 2            |
| 16 | <i>Quercus pubescens</i> Willd.     | 4.5            | 6                       | 27.05.2015 | 2            |
| 17 | <i>Paliurus spina-christi</i> Mill. | 2.6            | 3.1                     | 26.05.2015 | unind.       |
| 18 | <i>Acer negundo</i> L.              | 6              | 8.5                     | 26.05.2015 | unind.       |
| 19 | <i>Quercus cerris</i> L.            | 4              | 7                       | 26.06.2015 | unind.       |
| 20 | <i>Quercus cerris</i> L.            | 5              | 9                       | 26.06.2015 | unind.       |
| 21 | <i>Salix alba</i> L.                | 6              | 9                       | 26.06.2015 | unind.       |
| 22 | <i>Robinia pseudoacacia</i> L.      | 6              | 8                       | 28.06.2015 | unind.       |
| 23 | <i>Pinus nigra</i> Arn.             | 6              | 9                       | 28.06.2015 | 2            |
| 24 | <i>Acer negundo</i> L.              | 8              | 11                      | 02.07.2015 | unind.       |
| 25 | <i>Salix alba</i> L.                | 4.5            | 7                       | 11.07.2015 | unind.       |
| 26 | <i>Quercus pubescens</i> Willd.     | 5              | 7                       | 11.07.2015 | 1            |
| 27 | <i>Pinus nigra</i> Arn.             | 10             | 11                      | 12.07.2015 | unind.       |
| 28 | <i>Pyrus</i> L. sp.                 | 3.5            | 5                       | 01.05.2016 | 0            |
| 29 | <i>Ulmus minor</i> Mill.            | 2.6            | 3                       | 01.05.2016 | unind.       |
| 30 | <i>Paliurus spina-christi</i> Mill. | 2.1            | 3                       | 02.05.2016 | unind.       |
| 31 | <i>Quercus cerris</i> L.            | 3.5            | 8                       | 21.05.2016 | unind.       |
| 32 | <i>Pinus nigra</i> Arn.             | 7              | 9.5                     | 23.05.2016 | unind.       |

| No | Species of tree/shrub   | Nest height, m | Plant species height, m | Data       | Eggs, number |
|----|-------------------------|----------------|-------------------------|------------|--------------|
| 33 | <i>Quercus</i> L. sp.   | 4.5            |                         | 03.06.2016 | unind.       |
| 34 | <i>Pinus nigra</i> Arn. | 6.5            | 10                      | 04.06.2016 | unind.       |
| 35 | <i>Ulmus</i> L. sp.     | 4              | 6.5                     | 30.06.2016 | unind.       |
| 36 | <i>Pinus nigra</i> Arn. | 8              | 10                      | 01.07.2016 | unind.       |
| 37 | <i>Pinus nigra</i> Arn. | 6              | 9                       | 02.07.2016 | unind.       |

The average height of the nests was  $5.3 \pm 1.8$  (2.1–10) m (mean  $\pm$  SD (min–max)). The average height of the trees or shrubs on which nests were located was  $7.9 \pm 2.5$  (3–12) m. Most nests were found on deciduous trees – *Quercus* sp. (Fig. 2).

The first observed nests were on 01.05.2016, 02.05.2014 and 06.05.2015. The earliest eggs were observed first on 21.05.2015 (Table 1). The second clutch was probably formed in the end of June. A nest of two eggs on Austrian Pine was observed on 28.06.2015. Copulation of Turtle Doves was observed on 29.06.2015. Groups of well-flying juveniles were detected at the earliest on 14.06.2014;

26.06.2015 and 04.06.2016.

Singing Turtle Doves were observed on 23.05.2014 in Kolarovo village, and on 02.05 and 22.05.2016 in Rogozinovo village. On 11.07.2015 a Turtle Dove nest was found at a height of 4.5 m on White Willow (*Salix alba* L.) with a height of 7 m at 25 meters in a straight line from the closest house within the village of Bulgarin (N4157.302; E2556.823). This was the only confirmed breeding of the species within human settlement found during this study.

Five crops of Turtle Doves were analyzed. Analysis showed the presence of developed epithelial tissue in four of

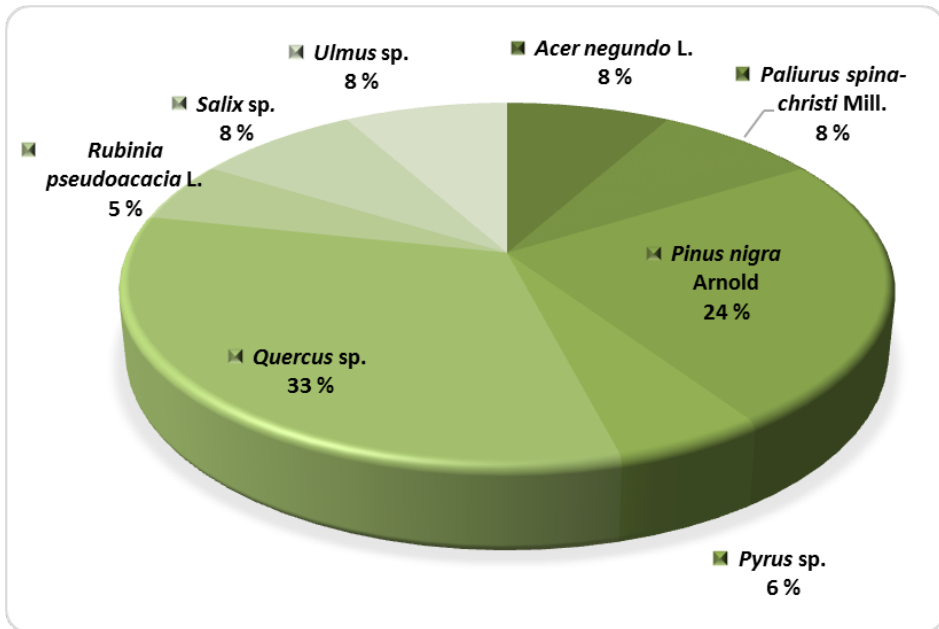


Fig. 2. Distribution of observed nests according to tree and shrub species.

them. The crops were from the hunted turtle doves found on 08.08.2015 and 15.08.2015. This fact causes suggestions for a third or replacement breeding of the species in 2015.

## Discussion

In the present study, the number of nests found in Oak forests ( $n=120$ ) predominates. Turtle Dove is one of the dominant species in similar forests in Bulgaria (Simeonov and Petrov 1978, Petrov 1981, Nankinov 1994). It is a high density species in the belts of Dobrudzha, where the oaks predominate (Karaivanov 2003), in the forests of Kermes Oak (*Quercus coccifera* L.), and the low forests in southern Dobrudzha (Karaivanov 2005, Karaivanov et al. 2006). The large number of nest found in Austrian Pine conifers ( $n=9$ ) is reported for the first time in Bulgaria. Previous studies do not mention nests in conifers (Nankinov 1994), but are known to be found in conifers in Europe (Browne et al. 2005). In the present study, the prevailing height of found nests is between 2.1 and 6 m, similar to other studies (Patev 1950, Nankinov 1994, Browne and Aebisher 2004, Browne et al. 2005). But unlike them, we did not find nests at height below two meters. Half ( $n=17$ ) of established nests are between 6.1 and 10 m high. The greater height of the nests is due to their location – the nests built on trees predominate. The high nesting location could be due to the larger hunting press by the predators or the decontamination of pastures and the lack of sufficient nesting places at a small height. In the habitats where the shrubs of the Jerusalem Thorn are preserved, they are 3.1 m high and the nests were always located at the top of the bushes (Table 1). High mountain

nests in Bulgaria are reported for Stara Planina Mountain (Donchev 1970).

The first nests were observed on 01.05., eggs on 21.05., and well-flying juveniles on 04.06. Similar data are available for Turtle Dove in other studies (Simeonov et al. 1990, Milchev 1991, Nankinov 1994, Browne et al. 2005, Baptista et al. 2015). This study indicates the end of June as the probability of the second clutch. This information coincides with the indicative deadlines in such studies (Simeonov et al. 1990, Milchev 1991, Nankinov 1994, Browne and Aebisher 2004). The average brood size in this study is 1.7 ( $n=11$ ). Although the obtained result is similar to that of other studies (Browne and Aebisher 2004, Browne et al. 2005, Baptista et al. 2015), the sample is very small to be representative.

Established crops with developed epithelial tissue in August suggest a third or replacement breeding attempt of the species in Bulgaria. Milchev and Kovachev (1998) report the possible third clutch. The same authors found a nest of Oriental Hornbeam (*Carpinus orientalis* Miller), and on 06.08.1994 nestlings about one week old (Milchev and Kovachev 1998). The established nesting of the Turtle Dove in the settlements was predicted by a number of observations of singing birds – on a lamp from street lighting in the village of Valchi Izvor, Bolyarovo municipality, on 01.06.2013, as well as a couple with a singing bird in the village of Dolno Yabalkovo on 02.05.2016 (Milchev unpubl. data). Nankinov (1981) reports the occupation of breeding territories on the periphery of settlements. In the period 1996–2005 singing Turtle Doves were observed in scattered mountainous neighbourhoods, but no breeding was established (Stoychev and Mitev 2007). The nest found in this study establishes

the possibility of the single nesting of the Turtle Dove in settlements and indicates a confirmed breeding of the species in small towns and villages in Bulgaria. Turtle Dove is known as a breeding species in parkland in Europe (Paton et al. 2012).

## Conclusion

The average height of the nests was 5.3 m and the average height of the trees or shrubs on which nests were located was 7.9 m. The first observed nests were on 01, 02 and 06 May. The earliest eggs were first observed on 21.05.2015. A nest of two eggs on Austrian Pine was observed on 28.06.2015. Copulation of Turtle doves was observed on 29.06.2015. Groups of well-flying young turtle doves were detected at the earliest on 14.06.2014; 26.06.2015 and 04.06.2016. Analysis of crops of turtle doves showed the presence of developed epithelial tissue in four of them.

Singing turtle doves were observed on 23.05.2014 in Kolarovo village, and on 02.05. and 22.05.2016 in Rogozinovo village. On 11.07.2015 a turtle dove nest was found at a height of 4.5 m on Willow tree with a height of 7 m at 25 meters in a straight line from the closest house within the village of Bulgarian (N4157.302; E 2556.823). This was the only confirmed breeding of the species found during this study.

This study determines Oak forests, coniferous plantations, and single-tree in Jerusalem Thorn communities as important for the nesting of the Turtle Dove in the Sakar Mountains. Broadleaved forests are the habitats with the most found nests. Their continued fragmentation, as well as periodic burning over the years, can aggravate the Turtle Dove nesting habitats.

As an alternative, coniferous crops appear in the absence of sufficient nesting habitats. *Paliurus* scrubs with single trees in them also provide suitable nesting sites, but this should be taken into account when decontamination the pastures in the research area. Full decontamination may reduce the habitat of the species. It is necessary to establish the reasons for the high nesting location. Providing more nesting places could increase nesting density of the species in the Sakar Mountain.

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