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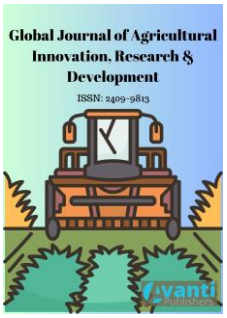

New Breeding Localities of Stock Pigeon (*Columba oenas* Linnaeus, 1758) in Bulgaria: Do Game Feeding Grounds Contribute to Increasing Distribution of the Species?

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ABSTRACT

Between 2020-2023, seven UTM squares were visited in Balkan Mountain and Sarnena Sredna Gora Mountain. Five new localities of Stock Pigeon with a certain breeding category were reported. In three of them, the birds regularly visited feeding grounds for big game. In two of the localities, the breeding category was determined as confirmed breeding, and in the remaining three was probable breeding. In the present study, food complexes in some of the squares provided the seed supply at the beginning of the breeding season, and croplands, pastures, and meadows provided food resources during the fledging period, this is also the most likely reason for the increase in the breeding distribution of the species in the studied area.

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1. Introduction

Through various adaptations, species occupy specific ecological niches determined by environmental conditions and available resources. Very often different species coexist in the same habitats [1-4]. In these habitats, they compete for available resources, often leading to the extinction of one species or adaptation to coexistence between species [5-7]. Habitat loss sometimes leads to increased interspecific competition, a classic example of this in Europe being the effects of modern agriculture and deforestation. All this makes the species look for an opportunity to occupy new ecological niches [8-15].

Columbidae species are among the most widespread birds. They are found in a variety of habitats, with some pigeons also using similar nesting sites [9, 16]. Some pigeons, such as the Common Woodpigeon (*Columba palumbus*) and the Stock Dove (*Columba oenas*), however, can also be used as indicators of the habitats in which they occur. They can show to some extent the changes in the quality of the habitats [17-20]. At the same time, population trends of many forest species remain poorly studied in Central and Eastern Europe [21].

The Stock Pigeon (*Columba oenas*) is a resident and passage migrant for Bulgaria. Although it is in the category of least concern with increasing density on a global scale [22], Bulgaria is in the category of endangered [23] and is under a protection regime according to the national legislation (Biodiversity Act Annex III). In the past, the Stock Pigeon was widespread in Bulgaria, reaching 1400 m a.s.l. in the mountains [24]. Declining trends in distribution, however, were reported already in the middle of the last century [25]. These trends became increasingly clear in the 1980s and 1990s [26, 27]. During the period 1980-2005, the occupied breeding territory decreased by more than 50%, and the process continued until 2007 [28]. In the same period, the species disappeared as a breeder in Ponor Mountain [29].

The purpose of this study is to present data on 6 new localities of the Stock Pigeon with different breeding probabilities in Bulgaria. In three of the localities, big game feeding grounds have been built, which the pigeons regularly visit.

2. Materials and Methods

2.1. Study area

The studied territory covers seven 10km UTM squares of Sarnena Sredna Gora Mountain (KH and LH 35T) and two squares of Balkan Mountain (LH, 35T) (Fig. **1**).

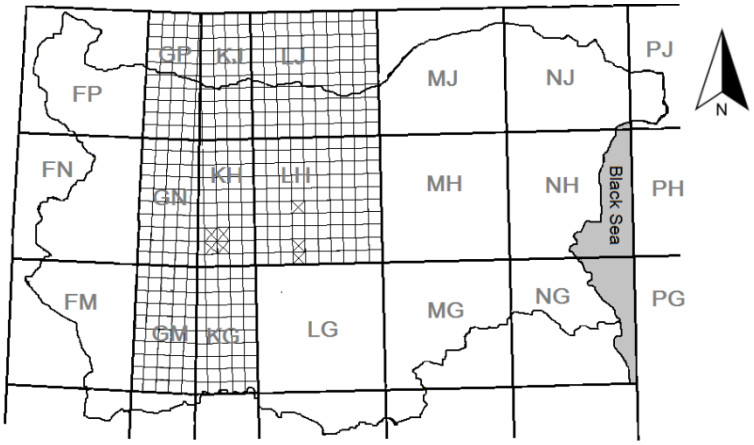

Figure 1: Study area. (The UTM squares of study are in x in KH and LH UTM 35T [30]).

The main habitats in the study squares include forests and open areas. Forest areas are represented by beech forests (*Fagus sylvatica* L.), oak forests (Quercus species), and mixed broadleaf forests (Oriental hornbeam (*Carpinus orientalis* Mill.) and oak species). Small areas have coniferous culture mainly from Scots pine (*Pinus*

silvestris L.) [31, 32]. Open habitats are represented by mountain pastures and meadows, and cultivated lands occupy a small part of the studied territory. The arable land, mainly cereal crops, has a small area of a few acres and aims to improve the natural food for the game species.

2.2. Data Collection

The study area was visited twice a year between 2020-2023 years from March to July. In each square, all macro habitats. Stock Pigeons were registered visually or by sounds. We additionally collected information from photo traps placed at game feeding grounds in the respective squares. Breeding probability was assessed according toYetman (1976) and used by Hagemejer and Blair [33, 34].

3. Results

The first new locations of Stock Pigeons were reported on 02.03.2020 in squares KH 71. In the same year, the doves were also observed at the food complexes for the big game. The first singing pigeons were found on 05.03.2020; again song and mating games were registered on 18.06.2020. Throughout the study period, where there were feeding complexes, Stock Pigeons were observed regularly, feeding together with other bird species (*Columba palumbus, Fringila coelebs, Chloris chloris, Garrulus glandarius,* and *Corvus corax*), once in the spring with Turtle Dove (*Streptopelia turtur*). They also fed on Wild Boars (*Sus scropha*) and Red Deer (*Cervus elaphus*), without being distributed by large game species (Fig. **2**).

Figure 2: (**A**) Stock Pigeons (*Columba oenas*) with Red Deers (*Cervus elaphus*) (**B**) Stock Pigeons (*Columba oenas*) in squares KH 71 and KH 72 in-game feeding grounds (**C**) Wild Boars (*Sus scrofa*) and Wood Pigeons (*Columba palumbus*) and (**D**) with Eurasian Jay (*Garrulus glandarius*).

In 2022, the Stock Pigeon was found with the category of confirmed breeding in squares KH 71 and KH 72 and probable breeding in KH 62. In the same year, it was also reported as probable breeding in LH 30 square.

In 2023, in addition to the already established localities, the Stock Pigeon was also found in LH 34 square with a probable breeding category. Thus, for the study period, 5 new breeding sites with a certain breeding category were reported and 2 sites known from the past were confirmed (KH 61 and LH 31, Fig. **3**). All sites are in pure beech forests, and 4 of the sites there are built feeding grounds for big game, which the birds visit all year round.

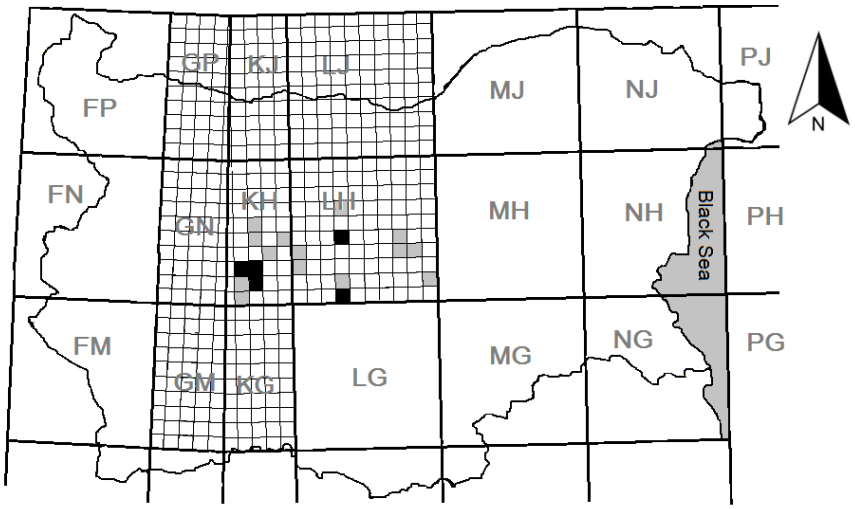

Figure 3: Distribution in Stock Pigeons (*Columba oenas*) in expected UTM squares. (in black a new breeding localities reported in this study; in grey are old breeding localities reported from [7]).

4. Discussion

In Europe there is an overall positive trend in the population of forest birds, including the Stock Pigeon [35–39]. Globally, the species is showing increasing trends in distribution and numbers [22]. Studies in the UK indicate a 124% population increase [40] In Bulgaria, there are no recent studies on the size of the population, but at the end of the last and the beginning of this century, the species showed decreasing trends in numbers and distribution in Bulgaria [28]. The new localities established in this study indicate an expansion of the distribution in some mountains and a possible increase in the distribution of the species in Bulgaria. However, further studies are needed for this. The breeding of the species in the new localities in Sarnena Sredna Gora Mountain indicates the presence of suitable breeding sites (old forests with hollow trees) [41-43]. These nest sites also have easy access to natural food sources and water [44]. The regular visit to the food courts also shows the importance of available food resources, as one of the factors that determine distribution to a large extent. The availability of anthropogenic food resources can have broad ecological effects, affecting migration, body condition, and species reproduction [45-49]. Some studies in other columbid species have found a positive relationship between the food supplies of anthropogenic seeds early in the breeding season combined with available seed habitat after the young have hatched [50, 51]. In the present study, food courts in some of the squares provided the seed supply at the beginning of the breeding season, and croplands, pastures, and meadows provided food resources during the fledging period, this is also the most likely reason for the increase in the breeding distribution of the species in the studied area.

Conflict of Interest

The author declares that there is no conflict of interest.

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