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SYNANTHROPIZATION OF WOODPIGEON (*COLUMBA PALUMBUS*) IN UPPER POBUZHIA (UKRAINE)

V. V. Novak

Municipal Institution of Higher Education
"Bar Humanitarian Pedagogical College named after Mykhailo Hrushevskyi"
1 Hrushevskyi Sq., Bar, Vinnytsia Region 23000, Ukraine

Corresponding author e-mail: novakvova@ukr.net

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Background. Significant (over 20 %) forest cover of the region, a wide network of woodland belts, a high level of greening of villages and more than 200-year-old gardening traditions create favorable conditions for the existence of the Woodpigeon (*Columba palumbus*) and its settlement. Despite a rather wide distribution of the species in the region, its biological characteristics and the process of synanthropization remain insufficiently studied.

Materials and Methods. The study was conducted during 2006–2020. Breeding Bird Survey routes without zone limitations and spot surveys were performed to assess the density of the species. Records of the location and height of the nest, its size, the presence of egg-laying or nestlings, the age of the nestlings and building material were made for each nesting site. The main part of the material on rural settlements was collected on the territory of monitoring sites "Chornyi Ostriv" and "Medzhibizh", which covered 6 villages. Unpublished materials on the species in the region, collected by V. O. Novak in the period of 1990–2010, were also processed.

Results and Discussion. The Woodpigeon is a nesting migratory species in Upper Pobuzhia region. In recent decades, the region has seen a process of synanthropization of the species. The first cases of Woodpigeon nesting in the settlements of Upper Pobuzhia (west of Khmelnytskyi city) were discovered by V. I. Gulay in 1986–1990. In the region, woodpigeons first nested in villages (since 1986) and only then in the city of Khmelnytskyi (the first nest was found on 11.05.1994). Of the 390 registered nests, the share of identified nests (n = 390) in the settlements of Upper Pobuzhia was 50 % in the period of 1990–2000, 64 % in the period of 2001–2010, and 81 % in the period of 2010–2020. In the parks of Khmelnytskyi, the density of nesting in 2020 was 35 pairs/km^2,

while in the forests of the region – 4 pairs/km^2. On some streets of Khmelnytskyi, the density of nesting species is even higher – 43 pairs/km^2. In rural settlements, the Woodpigeon average density during the nesting period is 1.7 pairs/km^2, although in some villages it can reach 11 pairs/km^2. The birds use 33 species of trees and bushes and some structural elements of houses as support for the nest. In the process of synanthropization, the Woodpigeon has developed new adaptations in nesting and searching for food.

Conclusion. The process of synanthropization of the Woodpigeon in Upper Pobuzhia region has been taking place for the last 30 years. In its foraging behavior and tolerance to humans, it resembles a typical synanthropus – Feral Pigeon *Columba livia*, which indicates the successful synanthropization of the species.

Keywords: Woodpigeon, nesting, synanthropization, Upper Pobuzhia

INTRODUCTION

The region of Upper Pobuzhia covers the upper part of the basin of the Southern Bug River within the boundaries of Vinnytsia (west of the city of Vinnytsia) and Khmelnytskyi regions (central part of the region). Significant (over 20 %) forest cover of the region, a wide network of woodland belts, a high level of greening of villages and more than 200-year-old gardening traditions create favorable conditions for the existence of the Woodpigeon (*Columba palumbus*) and its settlement. Despite a rather wide distribution of the species in the region, its biological characteristics and the process of synanthropization remain insufficiently studied. The purpose of this study was to find out the density of the species during the nesting period, the peculiarities of its nesting and behavior in the settlements of Upper Pobuzhia region resulting from synanthropization.

MATERIALS AND METHODS

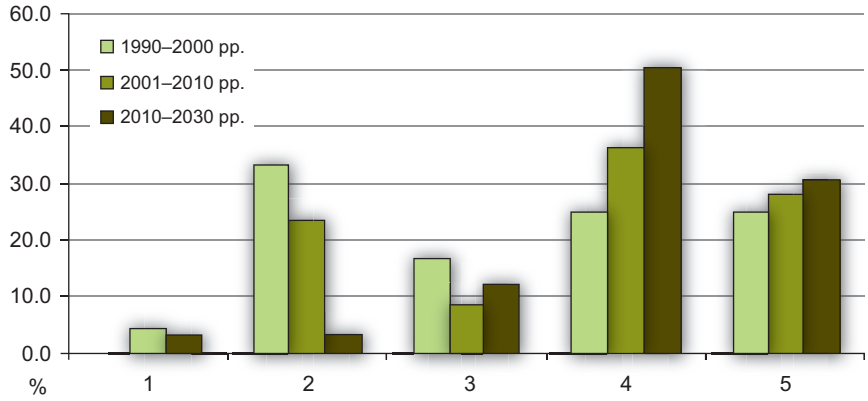
The study was conducted during 2006–2020 in natural biotopes, rural settlements of the region and in Khmelnytskyi, Derazhnia, Bar, Letychiv. Breeding Bird Survey routes without zone limitations and spot surveys were performed to assess the density of the species [6, 19]. Absolute nest counting was performed in some areas. If possible, the location and height of the nest, its size, the presence of egg-laying or nestlings, the age of the nestlings, building material, and in populated areas – the distance from buildings, sidewalks and streets were recorded for each nest. The main part of the material on rural settlements was collected on the territory of monitoring sites “Chornyi Ostriv” and “Medzhibizh”, which covered 6 villages, that differed in the number of inhabitants, the degree of urbanization and some other parameters [16]. Routes for bird count were laid out in each settlement so that the count area would cover the settlement as completely as possible. This excluded the possibility of passing the same route during one count. The speed of the check man was 3–4 km/h. Unpublished materials on the species in the region, collected by V. O. Novak in the period of 1990–2010, were also processed.

RESULTS AND DISCUSSION

The Woodpigeon is a nesting migratory species in Upper Pobuzhia region [15]. For a long time, woodpigeons inhabited only the forests of the region [4, 8, 17]. In recent decades, the region has seen a process of synanthropization of the species, which began in Western Europe in the second half of the nineteenth century, resulting in the formation

of synanthropic populations of the species in all European countries by the end of the twentieth century [3, 22]. The first cases of the Woodpigeon nesting in the settlements of Upper Pobuzhia (west of Khmelnytskyi city) were discovered by V. I. Gulay during 1986–1990 [5]. According to our data, an active process of synanthropization of the species has taken place in the region. Nearly in the same period, synanthropization of the Woodpigeon started in the neighboring regions of Western Ukraine [1, 7, 22]. However, in Central and Eastern Ukraine, the process of synanthropization began only at the beginning of the XXI century and is not so intense [9, 14, 20, 24]. Furthermore, while for other regions researchers note the nesting of the Woodpigeon in cities [1, 7, 9, 12, 20, 22, 24], in our region, woodpigeons first nested in villages (since 1986) and only then in the city of Khmelnytskyi (the first nest was found on 11.05.1994).

Analysis of the reliable cases of nesting of the species registered by us in different biotopes (n = 390) revealed that the share of identified nests in the settlements of Upper Pobuzhia was 50 % in the period of 1990–2000, 64 % in the period of 2001–2010, and 81 % in the period of 2010–2020 (see **Figure**).



Proportion (%) of identified Woodpigeon nests in various biotopes of Upper Pobuzhia region in 1990–2020: 1 – riverside planting zones; 2 – woodland belts; 3 – forests; 4 – villages; 5 – cities.

Частка (%) виявлених гнізд припутня у різних біотопах Верхнього Побужжя в 1990–2020 роках: 1 – прибережні насадження; 2 – лісосмуги; 3 – ліси; 4 – села; 5 – міста

It should be noted that in 2010, 27.7 % of the nests that we found were in in the city of Khmelnitskyi. At that time, in the city of Vinnytsia (the eastern border of our region), the Woodpigeon was found only in the post-nesting period [13], and by 2017 its nests had already been registered in parks and squares of the city [14]. Today, the number of woodpigeons in city parks significantly exceeds their number in forests [9, 20]. According to our data, in the parks of Khmelnytskyi, the density of nesting in 2020 was 35 pairs/km^2, while in the forests of the region – 4 pairs/km^2. On some streets of Khmelnytskyi (Prospekt Myru, Zarichanska Street), in areas of multi-storey buildings, the density of nesting species is even higher – 43 pairs/km^2. In rural settlements, the Woodpigeon average density during the nesting period is 1.7 pairs/km^2, whereas in some villages it can reach 11 pairs/km^2.

Analysis of the Woodpigeon nests for which the exact location is known (n = 382) showed that birds use 33 species of trees and bushes and some structural elements of houses as support for their nests (see **Table**). In riverside planting zones, the Woodpigeon nests on 7 species of trees (mainly on *Salix alba* – 30 % of all cases in a biotope),

in woodland belts – on 9 (mainly on *Prunus cerasifera* – 38 % of all cases in a biotope), in forests – on 15 (mainly on *Carpinus betulus* – 30 % of all cases in a biotope), in cities – on 20 (mainly on *Acer platanoides* – 26 % of all cases in cities), in villages – on 23 (mainly on *Tilia cordata* – 15 % of all cases in villages).

The number of found Woodpigeon nests located on different species of trees

Кількість знайдених гнізд припутня на деревах різних dblsd

No	Species	Number	%
1	*Prunus cerasifera*	35	9.2
2	*Euonymus europaeus*	2	0.5
3	*Ulmus minor*	2	0.5
4	*Sambucus nigra*	3	0.8
5	*Syringa vulgaris*	3	0.8
6	*Betula pendula*	14	3.7
7	*Salix alba*	13	3.4
8	*Salix babylonica*	2	0.5
9	*Salix pentandra*	1	0.3
10	*Prunus cerasus*	9	2.4
11	*Alnus glutinosa*	2	0.5
12	*Aesculus hippocastanum*	17	4.5
13	*Juglans regia*	14	3.7
14	*Carpinus betulus*	16	4.2
15	*Pyrus communis*	14	3.7
16	*Sorbus aucuparia*	5	1.3
17	*Crataegus* sp.	5	1.3
18	*Quercus robur*	5	1.3
19	*Acer platanoides*	41	10.7
20	*Acer campestre*	1	0.3
21	*Acer negundo*	22	5.8
22	*Tilia cordata*	55	14.4
23	*Populus nigra*	6	1.6
24	*Robinia pseudoacacia*	14	3.7
25	*Prúnus doméstica*	4	1.0
26	*Pinus sylvestris*	4	1.0
27	*Thuja occidentalis*	18	4.7
28	*Prunus padus*	1	0.3
29	*Prunus avium*	5	1.3
30	*Malus domestica*	14	3.7
31	*Fraxinus excelsior*	16	4.2
32	*Picea abies*	16	4.2
33	*Picea pungens*	1	0.3
34	The protrusion of the building column	1	0.3
35	Advertising construction of Privatbank on the wall	1	0.3
		382	100.0

The nests were found on a total of 30 species of trees and bushes in different settlements. In addition, in the city of Khmelnytskyi we noted 2 cases of location of woodpigeons' nests on the structural elements of buildings; similar tendencies can be observed in synanthropic populations of some European cities [2] and Western Ukraine [11]. Differences in the size of nests and eggs in pairs nested in natural biotopes and pairs nested in settlements were not revealed.

However, in the process of synanthropization, the Woodpigeon has developed new adaptations in nesting and search for food:

- building of nests in settlements begins 2 weeks earlier than in natural habitats;
- birds use the same tree for nesting for several years in a row, and often the same place in the crown of the tree (the longest term, from registered cases, – 6 years);
- they use not only their own old nests, but also old nests of other species (Greenfinch (*Chloris chloris*), Eurasian jay (*Garrulus glandarius*)) as a basis for new nests;
- the minimum distance of intimidation of birds that feed on sidewalks, streets, roadsides in villages is 2 meters, and in the cities of the region –1 m;
- sometimes, the bird that incubates the laying does not leave the nest even when a human is at an arm's length;
- nests are often located near sidewalks at an insignificant height;
- in some parks, ring doves show elements of semi-colonial nesting when the distance between several neighboring nests varies between 5 and 10 m;
- on average, nests in settlements are located at a height of 5.5 m, while in forests – at 10 m;
- the latest nests with chicks in settlements were discovered in September, whereas in natural habitats – in July.

CONCLUSION

The process of synanthropization of the Woodpigeon in Upper Pobuzhia region in Ukraine has been taking place for the last 30 years. During this time, the species has inhabited all settlements in the region. Today, apparently, the density of the nesting population has reached its maximum in the settlements of the region since most of the locations suitable for nesting are occupied by nesting pairs. In its foraging behavior and tolerance to humans, the Woodpigeon resembles a typical synanthropus – Feral Pigeon *Columba livia*, which indicates a successful synanthropization of this species.

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COMPLIANCE WITH ETHICAL STANDARDS

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Human Rights: This article does not contain any studies with human subjects performed by any of the authors.

Animal Studies: All institutional, national and institutional guidelines for the care and use of laboratory animals were followed.

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СИНАНТРОПІЗАЦІЯ ПРИПУТНЯ *COLUMBA PALUMBUS* У РЕГІОНІ ВЕРХНЬОГО ПОБУЖЖЯ (УКРАЇНА)

В. В. Новак

Барський гуманітарно-педагогічний коледж ім. М. Грушевського
майдан Грушевського, 1, Бар, Вінницька обл. 23000, Україна
e-mail: novakvova@ukr.net

Вступ. Значна (понад 20 %) лісистість регіону Верхнє Побужжя, широка мережа лісосмуг, високий ступінь озеленення сіл і понад 200-літні традиції садівництва створюють сприятливі умови для існування припутня (*Columba palumbus*) та заселення ним населених пунктів. Незважаючи на досить значне поширення виду в регіоні, його біологічні особливості і процес синантропізації залишаються недостатньо вивченими.

Матеріали і методи. Дослідження проводили протягом 2006–2020 років. Для оцінки щільності виду проводили маршрутні обліки без обмеження смуги обліку та точкові обліки. По кожному факту гніздування фіксували місце і висоту розташування гнізда, його розміри, наявність кладки чи пташенят, вік пташенят, будівельний матеріал. Основну частину матеріалу по сільських населених пунктах зібрано на території моніторингових ділянок "Чорний Острів" і "Меджибіж", які охоплювали по 6 сіл. Також опрацьовано неопубліковані матеріали стосовно виду в регіоні В. О. Новака, які були ним зібрані у період 1990–2010 рр.

Результати. Припутень є гніздовим і перелітним видом у регіоні Верхнього Побужжя. Останні десятиліття у регіоні спостерігається процес синантропізації виду. Перші випадки гніздування припутня у населених пунктах Верхнього Побужжя (західніше м. Хмельницький) виявив В. І. Гулай у 1986–1990 роках. У регіоні припутні спочатку з'явились на гніздуванні в селах (з 1986 р.) і лише

пізніше у м. Хмельницький (перше гніздо знайдено 11.05.1994 р.). Із зареєстрованих 390 гнізд частка виявлених у населених пунктах Верхнього Побужжя становила у період 1990–2000 років – 50 %, у період 2001–2010 рр. – 64 %, у період 2010–2020 рр. – 81 %. У парках м. Хмельницький щільність припутня на гніздуванні на 2020 рік становить 35 пар/км^2, в той час як у лісових масивах регіону – 4 пари/км^2. На деяких вулицях м. Хмельницький щільність виду на гніздуванні ще вища і становить 43 пари/км^2. У сільських населених пунктах щільність припутня у гніздовий період у середньому становить 1,7 пари/км^2, хоча в деяких селах може сягати 11 пар/км^2. Птахи як опору для гнізда використовують 33 види дерев і чагарників та деякі конструктивні елементи будинків. У процесі синантропізації у припутнів з'явилися нові адаптації у гніздовій і кормопошуковій поведінці.

Висновки. Протягом останніх 30 років відбувається процес синантропізації припутня у регіоні Верхнього Побужжя. За цей час вид заселив усі населені пункти регіону. У кормопошуковій поведінці й терпимості до присутності людини нагадує типового синантропа – голуба сизого *Columba livia*, що свідчить про успішну синантропізацію цього виду.

Ключові слова: припутень, гніздування, синантропізація, Верхнє Побужжя

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