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Coexistence of Syrian Woodpecker *Dendrocopos syriacus* and Great Spotted Woodpecker *Dendrocopos major* in nonforest tree stands of the agricultural landscape in SE Poland

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Abstract: The number and habitat preferences of Syrian Woodpecker *Dendrocopos syriacus* and Great Spotted Woodpecker *Dendrocopos major* was assessed in 2004–2015 in a 305 km^2 area of SE Poland. An assessment of the number of breeding pairs of these sympatric species was carried out in the nonforest tree stands of the agricultural landscape, which consisted of a total area of 41.7 km^2. A significant decrease in the density of Syrian Woodpeckers was noted, from 12.2 to 3.8 (down to 31%) breeding pairs/10 km^2 nonforest tree stands, whereas the density of Great Spotted Woodpeckers increased from 0.7 to 1.7 (ca. 140%) breeding pairs/10 km^2 nonforest tree stands. Syrian Woodpeckers mainly inhabited afforestations located outside of parks (91%, N = 99), whereas Great Spotted Woodpeckers were much more likely to inhabit territories within parks (47%, N = 15). The frequency with which Great Spotted Woodpeckers inhabited parks increased as the density of Syrian Woodpeckers decreased in the study area and as the area of tree cover increased within parks. The increase in the number of Great Spotted Woodpecker breeding territories in the nonforest tree stands of the study area probably resulted from their recolonization of this habitat, enabled by the decrease of the Syrian Woodpecker population.

Key words: Primary hole nesters, habitat preferences, rural landscape, afforestations

1. Introduction

As a result of the expansion of the Syrian Woodpecker *Dendrocopos syriacus*, it currently occurs sympatrically with the Great Spotted Woodpecker *Dendrocopos major* in a large part of Europe (Flade, 1997; Munteanu and Samwald, 1997; Michalczuk, 2014). Both species inhabit a large variety of tree stands, although the Syrian Woodpecker prefers mainly nonforest stands (Glutz von Blotzheim and Bauer, 1980; Cramp, 1985). In Asia Minor and the Balkans, as well as in Central Europe, this species mainly colonizes tree stands located among the residential buildings of villages and towns (Szlivka, 1957, 1962; Ruge, 1969; Mendelssohn and Yom-Tov, 1999; Al-Safadi, 2004; Michalczuk and Michalczuk, 2011; Fröhlich and Ciach, 2013; Michalczuk and Michalczuk, 2016). In agricultural landscapes, this species mainly inhabits orchards, rows of trees along roads and avenues, and even individual trees (Szlivka, 1957, 1962; Ruge, 1969; Marisova and Butenko, 1976; Michalczuk et al., 2011; Michalczuk and Michalczuk, 2015, 2016). In urban areas, it is mostly observed in gardens or parks, as well as in roadside tree plantings (Mošanský and Mošanský, 1999; Biaduń, 2001; Fröhlich and Ciach, 2013). It also inhabits orchards and tree plantations (Mendelssohn and Yom-Tov, 1999; Al-Safadi, 2004; Aghanajafizadeh et al., 2011) and is only exceptionally found in forests (Kurek, 1984; Cramp, 1985; Michalczuk and Michalczuk, 2011, 2015), the original habitat of this species in Asia Minor (Winkler, 1973; Glutz von Blotzheim and Bauer, 1980). Forests are the main habitat of the Great Spotted Woodpecker (Glutz von Blotzheim and Bauer, 1980; Cramp, 1985), although this species can also be found in nonforest tree stands (Cramp, 1985; Hebda, 2009; Michalczuk and Michalczuk, 2016). However, it does not reach large densities in these habitats, and its territories are located usually in larger tree stands (e.g., Salvati et al., 2001; Mazgajski and Rejt, 2006; Myczko et al., 2014). This is also why it is mainly found within parks in urban and rural areas (Mošanský and Mošanský, 1999; Michalczuk and Michalczuk, 2016). The limited distribution in anthropogenic environments of the sociobiologically similar Great Spotted Woodpecker (Winkler, 1973; Glutz von Blotzheim and Bauer, 1980; Cramp, 1985) facilitates the Syrian Woodpecker's colonization of nonforest tree stands (Michalczuk and Michalczuk, 2016). However, the emergence of a new species in Europe could also displace the Great Spotted

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Woodpecker from such suboptimal habitats (e.g., Mitjaj, 1986; Mošanský and Mošanský, 1999).

This paper presents a study of the coexistence of the Syrian Woodpecker and the Great Spotted Woodpecker in the agricultural landscape of SE Poland. For this purpose, the habitat preferences of both species in nonforest tree stands were also determined.

2. Materials and methods

2.1. Study area

The study was conducted in southeastern Poland, approximately 10 km west of the border with Ukraine (50°28′N, 23°40′E; Michalczuk and Michalczuk, 2015, 2016). This area (approx. 305 km^2) is characterized by undulating hills located at 195–263 m above sea level (Kondracki, 2000). Crop fields dominate, constituting more than 71% of the area. Meadows, found in the valleys, occupy 11% of the area, and small forests occupy 4% (Michalczuk and Michalczuk, 2015, 2016). The western part of the area is dominated by pine forests, with a large proportion of *Pinus sylvestris*. Eastern areas are dominated by broadleaf forests, with a large share of common hornbeam *Carpinus betulus* and oak *Quercus* spp. The nonforest tree stands accompanying built-up areas are preferred by the Syrian Woodpecker (Michalczuk and Michalczuk, 2011, 2015, 2016) and constitute approximately 14% of the area (ca. 41.7 km^2). They consist mainly of orchards and are dominated by apples (*Malus domestica*), cherries (*Prunus cerasus*), plums (*Prunus* spp.), and walnuts (*Juglans regia*). Willow (*Salix* spp.), poplar (*Populus* spp.), maple (*Acer* spp.), and ash (*Fraxinus* spp.) are the main species of alleys, rows of trees, single trees, and parks. Rural parks cover from 1.5 to 12.4 ha with trees, covering from 0.6 up to 7.1 ha (average 2.9 ha; ±2.3; N = 9). Rarely are conifers, such as spruce (*Picea* spp.), European larch (*Larix decidua*), or Scots pine (*Pinus sylvestris*), found in the nonforest tree cover (Michalczuk and Michalczuk, 2015, 2016).

2.2. Assessment of the number and designation of the birds' territories

The study was conducted in 2004–2015. The cartographic method with voice stimulation was used to locate the woodpeckers (Michalczuk and Michalczuk, 2006a, 2006b). The birds were searched for mainly in anthropogenic tree stands (41.7 km^2) surrounding the residential buildings of each locality. Counts were carried out mainly along roads, where a point was designated at every 200–400 m for stimulation and listening for responses. At these sites, a 5-min sequence of Syrian Woodpecker calls and drumming was played. As soon as a woodpecker's reaction was noted, the stimulation was stopped. In the absence of a reaction, the point was monitored for 1 min, and then the observer moved to the next point where sound stimulation was continued (Michalczuk and Michalczuk, 2006a, 2006b). The sites of bird encounters were marked on a topographic map at a scale of 1:25,000 and 1:10,000. The sex of the birds, their individual plumage characteristics, and the direction of their flight were recorded. In order to determine the birds' territories, at least 6 controls of the entire study area were carried out each season from March to July. Territorial boundaries were determined by connecting the farthest external points in which the birds of a given breeding pair had been observed (for details see Michalczuk and Michalczuk 2015, 2016). A breeding territory was determined to be one in which the presence of birds had been confirmed at least three times, including at least one observation of a pair of birds or an alternating male and female (Michalczuk and Michalczuk, 2006a, 2006b, 2015, 2016). Once the counts were made, the density of the breeding pairs of each species was calculated for the area of the anthropogenic tree stands (nonforest).

2.3. The distribution of territories and statistical analysis

The study also assessed the extent to which woodpeckers used nonforest tree stands, with a particular emphasis on parks as the tree stand/habitat preferred by the Great Spotted Woodpecker in the agricultural landscape (Michalczuk and Michalczuk, 2016). For this purpose, the territories of both species were classified into two groups: 1) territories that included parks, and 2) territories whose area did not include parks. To assess the relationship between the Syrian and Great Spotted Woodpeckers' choice of habitat and both types of territories, the area of tree cover in individual parks was also assessed. For this purpose, the Geoportal website (http://www.geoportal.gov.pl/) was used. The areas covered by tree crowns were measured using polygonal vector layers, which were mapped on the basis of the orthophotograph taken in 2009. Syrian Woodpeckers' and Great Spotted Woodpeckers' territories in particular nonforest tree stands were compared by chi-square test with the Yates correction. Spearman's rank correlation was used for the analysis of interdependence occurrence and frequency of parks' occupancy by both woodpeckers' species. Calculations were performed using Statistica 7.1 and the level of the significance of differences was $P < 0.05$.

3. Results

In 2004, there were 49 breeding pairs of Syrian Woodpeckers in the study area, and 2 years later there were 51 breeding pairs. After that season, a decline in the number of Syrian Woodpeckers was noted ($r_s = -0.972$; N = 12; $P < 0.05$) to 2015, when 16 breeding pairs were found. The density of breeding pairs decreased from 12.2 to 3.8 (down to 31%) breeding pairs/10 km^2 of anthropogenic tree stands. The changes noted for the Great Spotted Woodpecker were reversed; in 2004 their number was 3 breeding pairs, and at the end of the study period its increase was statistically

significant (r_s = 0.688; N = 12; P < 0.05), ranging from 5 to 7 breeding pairs. As the density of Syrian Woodpeckers decreased, the density of Great Spotted Woodpeckers increased significantly from 0.7 to 1.7 (ca. 140%) breeding pairs/10 km^2 of nonforest tree stands (r_s = –0.611; N = 12; P < 0.05; Figure 1).

Both studied species exhibited differentiated territorial habitat preferences in nonforest tree stands (χ^2 = 12.29; df = 1; P = 0.0005). Most Syrian Woodpecker territories (91%, N = 99) were located primarily outside of parks, while parks constituted 47% of Great Spotted Woodpecker territories (N = 15; Figure 2). The frequency with which Great Spotted Woodpeckers inhabited parks increased with each year of the study (r_s = 0.674; N = 12; P < 0.05), from 11% to 56% in 2015, while the frequency with which this species occupied territories outside of parks did not change (r_s = –0.051; N = 12; P > 0.05). Over the years, the occupation of parks by the Syrian Woodpecker decreased (r_s = 0.633; N = 12; P < 0.05), from 56% to 11%. As the density of Syrian Woodpeckers declined, an increase was observed in the density of the territories occupied by the Great Spotted Woodpecker in parks (r_s = –0.604; N = 12; P < 0.05; Figure 3). The opposite trend was observed for the Syrian Woodpecker, but in this case it was not found statistically significant (r_s = 0.573; N = 12; P > 0.05; Figure 3).

The frequency with which Great Spotted Woodpeckers inhabited parks increased as the area of the tree stand in the parks also increased (r_s = 0.788; N = 9; P < 0.05). Such a dependence was not found in the case of the Syrian Woodpecker (r_s = –0.238; N = 9; P > 0.05; Figure 4).

4. Discussion

Our findings indicate a clear decline of Syrian Woodpecker numbers in the agricultural landscape of southeastern Poland. The downward trend of this species' numbers is also observed in other areas of SE Poland, where population counts declining by 44% were noted in 2006–2011 (Michalczuk et al., 2011). Such significant changes in the Syrian Woodpecker population may be reflecting a population crash after its population explosion, which sometimes characterizes expansive species (Elton, 1967; Nowak, 1971; Shigesada and Kawasaki, 1997; Głowaciński, 2011). However, the decline of the Syrian Woodpecker may be the result of the degradation or elimination of the tree stands used by this species to breed. Such negative changes were found in SE Poland, especially for orchards, which are important nesting places for the Syrian Woodpecker in agricultural landscapes (Michalczuk and Michalczuk, 2015, 2016). These stands are important foraging areas used by the species throughout the year, and fruit trees are also the main source of plant food for

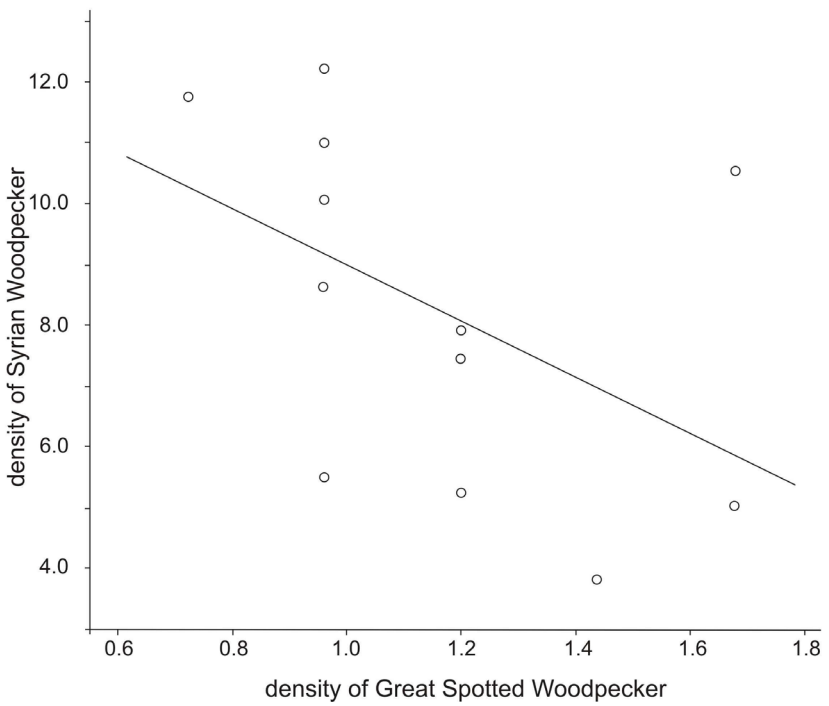

Figure 1. Correlation between the density (number of breeding pairs/10 km^2) of the Syrian Woodpecker and Great Spotted Woodpecker in nonforest tree stands of the agricultural landscape in SE Poland.

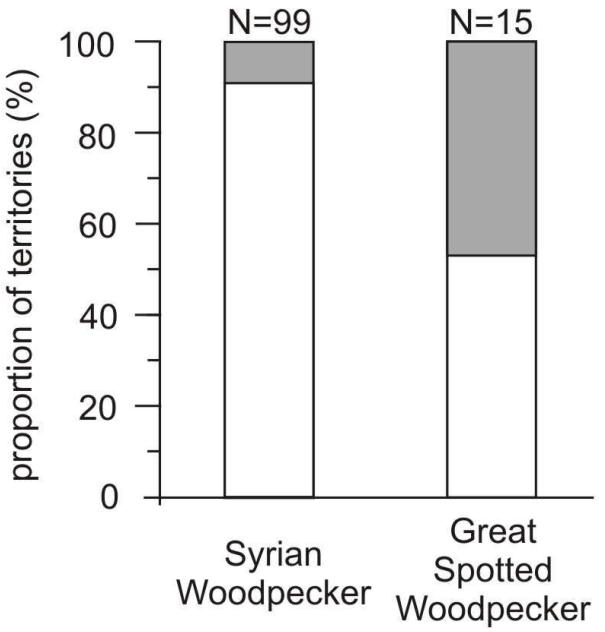

Figure 2. Locations of Syrian Woodpecker and Great Spotted Woodpecker territories in nonforest tree stands of the agricultural landscape in SE Poland. Legend: gray bars – territories with parks, white bars – territories without parks.

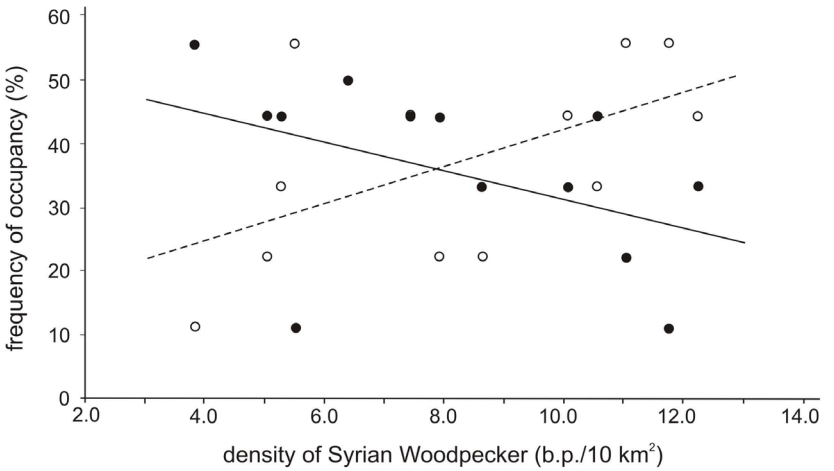

Figure 3. Frequency of the Syrian Woodpecker's (open dots and dashed line) and Great Spotted Woodpecker's (filled dots and continuous line) park occupancy depending on the density of Syrian Woodpeckers in the study area (breeding pairs/10 km^2).

Syrian Woodpecker nestlings (Stevanović, 1960; Szlivka, 1962; Glutz von Blotzheim and Bauer, 1980; Cramp, 1985). The loss or destruction of orchards, as well as other types of anthropogenic trees, could significantly threaten the existence of the Syrian Woodpecker in anthropogenic habitats (Michalczuk and Michalczuk, 2015).

The presence of the Great Spotted Woodpecker in anthropogenic tree stands proves that the Syrian Woodpecker penetrates only a partially available ecological niche as it colonizes new areas (Michalczuk and Michalczuk, 2016). This is confirmed by observations from various regions in Europe (Vojvodina, Austria, Ukraine, Slovakia), where, in addition to the Syrian Woodpecker, some territories in nonforest tree stands were also inhabited by the Great Spotted Woodpecker (Szlivka, 1957; Ruge, 1969; Winkler, 1973; Mitjaj, 1986; Mošanský

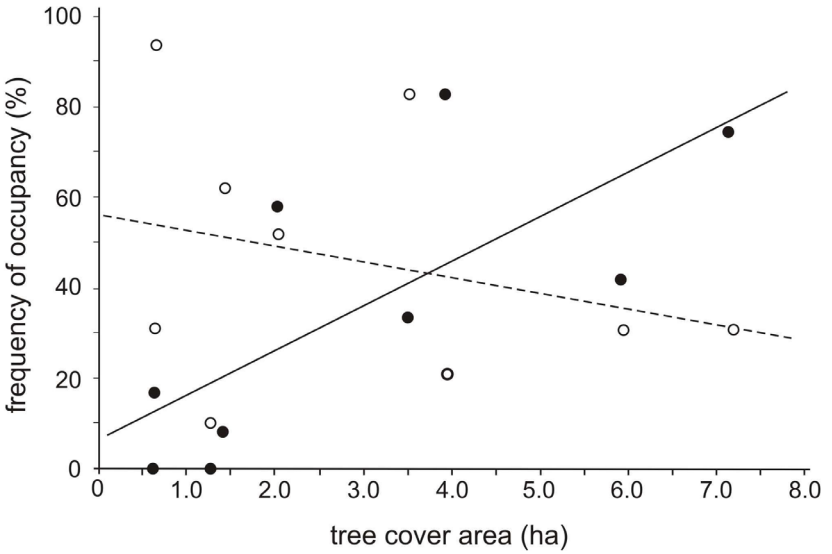

Figure 4. Frequency of the Syrian Woodpecker's (open dots and dashed line) and Great Spotted Woodpecker's (filled dots and continuous line) park occupancy depending on the area of the tree stand within the park.

and Mošanský, 1999). This ecologically flexible species is also able to avail itself of tree stands in the immediate vicinity of humans (Glutz von Blotzheim and Bauer, 1980; Cramp, 1985). However, as studies show, it achieves only a low density in such an environment. Additionally, this species usually restricts its occurrence in nonforest tree stands to the largest and densest tree stands, such as those of parks (Mošanský and Mošanský, 1999; Salvati et al., 2001). This trend was also confirmed in this study, as the Great Spotted Woodpecker often located its territory near parks. The Syrian Woodpecker did so significantly less often and its territories were located mainly outside of parks, being more frequently found in other types of anthropogenic tree stands. Such habitat and territorial exclusivity of the Syrian Woodpecker and Great Spotted Woodpecker is also a result of the similar sociobiology of both species (Winkler, 1971, 1972; Glutz von Blotzheim and Bauer, 1980; Cramp, 1985). This is probably why the Great Spotted Woodpecker was observed to have retreated to the densest tree stands in river valleys, groves, and parks, with the increase in Europe of the population and the colonization of nonforest habitats by the Syrian Woodpecker (e.g., Mitjaj, 1986). The opposite trend was confirmed in this study, which documented a significant decrease in Syrian Woodpecker numbers and its retreat from nonforest tree stands. This favored the increasingly more frequent penetration of these areas by the Great Spotted Woodpecker. At the same time, the frequency with which the Great Spotted Woodpecker inhabited parks also increased. It can therefore be assumed that the Great Spotted Woodpecker is currently recolonizing nonforest habitats from which it had probably retreated earlier, due to competitive displacement by the Syrian Woodpecker that colonized the region in the late twentieth century (Michalczuk, 2014). The coexistence of the Great Spotted Woodpecker and Syrian Woodpecker in nonforest habitats is possible due to the high ecological flexibility of both species, allowing them to colonize a wide variety of tree stands (Glutz von Blotzheim and Bauer, 1980; Cramp, 1985). However, as studies show, the Great Spotted Woodpecker locates its territories near dense tree stands, such as those in parks, whereas the Syrian Woodpecker mainly inhabits tree stands outside of parks.

References

Aghanajafizadeh A, Heydari F, Naderi G, Hemami MR (2011). Nesting hole site selection by the Syrian Woodpecker, *Dendrocopos syriacus*, in Yazad province, Iran. Zool Middle East 53: 3-6.

Al-Safadi MM (2004). On the breeding biology of the Syrian Woodpecker, *Dendrocopos syriacus*, in the Gaza Strip. Zool Middle East 32: 7-12.

Biaduń W (2001). Expansion of Syrian Woodpecker *Dendrocopos syriacus* in Lublin. In: Indykiewicz P, Barczak T, Kaczorowski G, editors. Bioróżnorodność i Ekologia Populacji Zwierzęcych w Środowiskach Zurbanizowanych. Bydgoszcz, Poland: NICE, pp. 232-235 (in Polish with abstract in English).

Cramp S (1985). The Birds of the Western Palearctic. IV. Oxford, UK: Oxford University Press.

Elton CS (1967). The Ecology of Invasions by Animals and Plants. Chicago, IL, USA: University of Chicago Press.

Flade M (1997). *Dendrocopos major* Great Spotted Woodpecker. In: Hagemeijer WJM, Blair MJ, editors. The EBCC Atlas of European Breeding Birds: Their Distribution and Abundance. London, UK: Academic Press, pp. 448-449.

Fröhlich A, Ciach M (2013). Distribution and abundance of the Syrian Woodpecker *Dendrocopos syriacus* in Kraków. Ornis Pol 54:237-246 (in Polish with abstract in English).

Głowaciński Z (2011). Introduction and mechanisms favoring alien animal invasions. In: Głowaciński Z, Okarma H, Pawłowski J, Solarz W, editors. Alien Species in the Polish Fauna. Kraków, Poland: Wyd. IOP PAN, pp. 653-670 (in Polish with abstract in English).

Glutz von Blotzheim UN, Bauer K (1980). Handbuch der Vögel Mitteleuropas. IX. Wiesbaden, Germany: Akademische Verlag (in German).

Hebda G (2009). Nesting sites of the Great Spotted Woodpecker *Dendrocopos major* L. in Poland: analysis of nest cards. Pol J Ecol 57: 149-158.

Kondracki J (2000). Geografia Regionalna Polski. Warsaw, Poland: Wyd. Nauk. PWN (in Polish).

Kurek H (1984). Syrian Woodpecker in the San Valley. Not Ornit 25: 65-68 (in Polish with abstract in English).

Marisova IV, Butenko AG (1976). Data on distribution and ecology of Syrian Woodpecker *Dendrocopos syriacus* in the Ukraine. Vest Zool 2: 29-34 (in Russian with abstract in English).

Mazgajski TD, Rejt Ł (2006). The effect of forest patch size on the breeding biology of the great spotted woodpecker *Dendrocopos major*. Ann Zool Fennici 43: 211-220.

Mendelssohn H, Yom-Tov Y (1999). A report of birds and mammals which have increased their distribution and abundance in Israel due to human activity. Isr J Zool 45: 35-47.

Michalczuk J (2014). Expansion of the Syrian Woodpecker *Dendrocopos syriacus* in Europe and Western Asia. Ornis Pol 55: 149-161.

Michalczuk J, Michalczuk M (2006a). Reaction on playback and density estimations of Syrian Woodpecker *Dendrocopos syriacus* in agricultural areas of SE Poland. Acta Ornithol 41: 33-39.

Michalczuk J, Michalczuk M (2006b). The usefulness of the mapping method with playback in estimation of the numbers of the Syrian Woodpecker *Dendrocopos syriacus*. Not Ornit 47: 175-184 (in Polish with abstract in English).

Michalczuk J, Michalczuk M (2011). Syrian Woodpecker *Dendrocopos syriacus* in the Upper Huczwa River Watershed in 2004-2006. Chrońmy Przyr Ojcz 67: 426-432 (in Polish with abstract in English).

Michalczuk J, Michalczuk M (2015). Decline of the Syrian Woodpecker *Dendrocopos syriacus* population in rural landscape in SE Poland in 2004–2012. Ornis Pol 56: 67-75 (in Polish with abstract in English).

Michalczuk J, Michalczuk M (2016). Habitat preferences of Picidae woodpeckers in the agricultural landscape of SE Poland: is the Syrian Woodpecker *Dendrocopos syriacus* colonizing a vacant ecological niche? North-West J Zool 12: 14-21.

Michalczuk J, Michalczuk M, Cymbała R (2011). The usefulness of various methods of monitoring the population size of the Syrian Woodpecker *Dendrocopos syriacus*. Ornis Pol 52: 280-287 (in Polish with abstract in English).

Mitjaj IS (1986). Syrian Woodpecker in the Forest-Steppe in Pridneprovsky Land. Birds Distribution in SSSR, Conservation and Rational Management. Leningrad, USSR: Akademija Nauk SSSR, pp. 70-71 (in Russian).

Mošanský L, Mošanský A (1999). Development of Syrian Woodpecker (*Dendrocopos syriacus*) and Great Spotted Woodpecker (*Dendrocopos major*) population in Košice urban area. Tichodroma 12 (Suppl. 1): 97-106.

Munteanu D, Samwald O (1997). *Dendrocopos syriacus* Syrian Woodpecker. In: Hagemeijer WJM, Blair MJ, editors. The EBCC Atlas of European Breeding Birds: Their Distribution and Abundance. London UK: Academic Press, pp. 450-451.

Myczko Ł, Rosin ZM, Skórka P, Tryjanowski P (2014). Urbanization level and woodland size are major drivers of woodpecker species richness and abundance. PLoS ONE 9: e94218.

Nowak E (1971). O rozprzestrzenianiu się zwierząt i jego przyczynach. Warsaw, Poland: Wyd. Inst. Ekol. PAN (in Polish).

Ruge K (1969). Beobachtungen am Blutspecht *Dendrocopos syriacus* im Burgenland. Vogelwelt 90: 201-223 (in German).

Salvati L, Manganaro A, Ranazzi L (2001). Wood occupation and area requirement of the Great Spotted Woodpecker *Picoides major* in Rome (Central Italy). Acta Ornithol 36: 19-23.

Shigesada N, Kawasaki K (1997). Biological Invasions: Theory and Practice. Oxford, UK: Oxford University Press.

Stevanović A (1960). Über die jahreszeitliche Spczialisierung der Nahrungsaufnahme beim Blutspecht, *Dendrocopos syriacus*, in der Umgebung von Kruševac (Župa) in Serbien. Larus 12-13: 55-64 (in German).

Szlivka L (1957). Von der Biologie des Blutspechts *Dendrocopos syriacus balcanicus*, und seinen Beziehungen zu den Staren, *Sturnus vulgaris*. Larus 9-10: 48-70 (in German).

Szlivka L (1962). Weitere Angaben über den Blutspecht aus der näheren Umgebung von Gunaroš. Larus 14: 121-134 (in German).

Winkler H (1971). Die artliche Isolation des Blutspechts *Picoides* (*Dendrocopos*) *syriacus*. Egretta 14: 1-20 (in German).

Winkler H (1972). Beitrege zur Ethologie des Blutspechts (*Dendrocopos syriacus*). Das nicht-reproduktive Verhalten. Z Tierpsychol 31: 300-325 (in German).

Winkler H (1973). Nahrungserwerb und Konkurrenz des Blutspechts *Picoides* (*Dendrocopos*) *syriacus*. Oecologia 12: 193-208 (in German).