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Density, nest site and breeding success of a rural population of the Magpie (*Pica pica*) in NE Slovenia

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Abstract: VOGRIN, M. (1998): Density, nest site and breeding success of a rural population of the Magpie (*Pica pica*) in NE Slovenia. Vogelwarte 39: 293–297.

Breeding ecology of a rural Magpie *Pica pica* population was studied in northeastern Slovenia during 1989–1991 and 1997. The estimated breeding density was 0.5 breeding pairs/10 ha on 346 ha of research area. Magpie nests were found in at least 14 species of trees or bushes. 24% of nests (N = 75) were found on coniferous trees. The height of the nest varied significantly according to the tree species. Nests were built significantly lower on bushes with thorns than in coniferous and deciduous trees. However, differences between coniferous and deciduous trees do not exist. Breeding success was low, 37% failed to fledge any young. The most important cause of nesting failures is predation with 32% of losses. The average clutch size was 6.0, SD = 0.93 (N = 28) and the average egg size was 33.6 ± 2.75 x 23.2 ± 0.69 mm (N = 80).

Key words: Magpie, *Pica pica*, breeding biology, Slovenia.

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1. Introduction

The Magpie *Pica pica* is a common bird in the Northern Palearctic and is distributed throughout most of Europe, Asia and north-west Africa (CRAMP & PERRINS 1994). Published information on the biology of the Magpie in the breeding season is extensive though not exhaustive. In Europe data are available for several geographic regions (see e.g. BIRKHEAD 1989, MÄCK 1991, GLUTZ VON BLOTZHEIM & BAUER 1993, CRAMP & PERRINS 1994, JERZAK 1995, JERZAK et al. 1997 and references therein). However, data from other areas e.g. southern from Alps and Balkans are scarce (e.g. FASOLA & BRICHETTI 1983).

The principal objective of the work described here was to present some data obtained on the rural population of the Magpie during breeding season.

2. Methods and study area

The data for this study were gathered in NE Slovenia (approximately 46° N, 16° E). Agricultural landscapes are prevailing in the lowland. The main crops being cereals, potatoes and sugar beet. Throughout the country we can find also numerous man-made water bodies (i.e. fish ponds, reservoirs, gravel pits) small towns and villages. The area belongs to the sub-Pannonic phytogeographical area (Marinček 1987). The climate is Continental (mean annual rainfall = 1000 mm, mean temperature = 8°C; Furlan 1990).

The research area was selected without prior knowledge of Magpie density. The number of breeding pairs was ascertained only on the basis of nests found. Nests was searched mainly in April and May before the expansion of tree leaves during 1989–1991 and 1997. At each nest I also identified the host tree species and measured the height from the ground to the nest bottom (nest height) to the nearest 0.1 m. 75 nests of the Magpie were found.

Breeding density was studied in 1997 on 346 ha research area located on Dravsko polje. Dravsko polje is situated between river Drava and Mt. Pohorje on altitude from 238 m to 270 m and it is alluvial plains. The main habitats are intensive fields, some meadows, traditional orchards and isolated small-sized island woods. Population density in investigated rural districts is about 190 residents per km^2. Detailed descriptions of the Dravsko polje and habitats are given in e.g. Vogrin (1996, 1997a, b,). The size of study area was measured from 1 : 25000 map.

The predation data are from direct observation according to Brown et al. (1987) and by information of other observers. This latter method was particularly relevant to those nests which were destroyed by man. However, this may give a bias towards nests destroyed by man.

Egg measurements were recorded during 1989–1991. For describing the size and shape of eggs I used four parameters: EL = egg length (mm), EB = egg breadth (mm), EV = egg volume (cm^3) and ES = egg shape index. The maximum length and breadth were measured to the nearest 0.1 mm using dial calipers. Egg volume was calculated according to e.g. Horak et al. (1995): $\pi/6 \times EL \times EB^2$. Egg shape index (ES) was calculated according to Horak et al. (1995): EB/EL (the larger the ES the rounder eggs).

Since the frequency distribution of several parameters did not appear normally distributed, I used nonparametric tests (Chi-square, Mann-Whitney U test and Kruskal-Wallis test) (Sokal & Rohlf 1995). All statistical tests were performed with the SPSS 6.0 statistical package. The Yates-correction was used when this was necessary.

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3. Results and discussion

3.1. Density and nest sites

The estimated breeding density was 0.5 breeding pairs/10 ha. This value is very close to the observed density in agricultural areas in England (BIRKHEAD 1989) and in Lower Savinja valley (pers.obs.) and much higher than ascertained near Ulm, Germany (MÄCK 1991). However, densities in urban areas are in general higher than in my study area (e.g. VUORISALO et al. 1992, KOOIKER 1995).

Magpie nests were found in at least 14 species of trees or bushes (Table 1). The observations show that Magpies are very flexible in their choice of nest sites. Flexibility in the nest site choice of the Magpie has been documented also by many other authors (e.g. FASOLA & BRICHETTI 1983, KAVANAGH 1987, JERZAK 1988, BIRKHEAD 1989, KOOIKER 1992, VUORISALO et al. 1992, KOOIKER 1995).

Among the 75 nests 18 nests (24%) were found on coniferous trees and the rest on deciduous trees. The difference between nest sites according to trees was significant (Yates correction Chi-square = 20.28, df = 1, $P < 0.001$). The Magpie prefers deciduous trees also in some areas in Fin-

Table 1: Tree and bush species used for Magpie *Pica pica* nests in northeastern Slovenia.
Tab. 1: Von der Elster *Pica pica* als Neststandort genutzte Baum- und Gehölzarten in NE-Slowenien.

Species	N	%
Pinus sylvestris	15	20.0
Pyrus spp.	12	16.0
Prunus spinosa	10	13.3
Alnus glutinosa	10	13.3
Salix spp.	5	6.6
Malus spp.	5	6.6
Prunus domestica	4	5.3
Juglans spp.	3	4.0
Quercus spp.	2	2.7
Betula spp.	2	2.7
Crategus spp.	2	2.7
Larix spp.	2	2.7
Robinia pseudacacia	1	1.3
Picea abies	1	1.3
Cupressus spp.	1	1.3
Fraxinus spp.	1	1.3
Total	75	100

land (see VUORISALO et al. 1992), in Poland (JERZAK 1988, 1995, 1997 and references therein, GORSKA & GORSKI 1997) and in Lower Saxony (KOOIKER 1995). Coniferous trees were avoided also in south-west Germany where Magpie favoured old untended pear *Pyrus* trees (PRINZINGER & HUND 1981) and in various European towns (see JERZAK 1997 and references therein). The share of coniferous trees in my study area was much higher than shares obtained by DITTRICH (1981) – 1%, PRINZINGER & HUND (1981) – 1% , LEMKE (1977) – 6.5% and KOOIKER (1995) – up to 17.5%, and little lower than result obtained by MÄCK (1991) – 35%. Nevertheless the *Pinus sylvestris* was the most common tree species used as Magpie nest sites, followed by old untended *Pyrus* spp., *Prunus spinosa* and *Alnus glutinosa* (Table 1). We must taken also into account that coniferous trees are scarce distributed in my study area. Thus, we can assume, that Magpies on Dravsko polje gave a priority to the coniferous trees. My results are in contrary with results from other authors from Central and southern Europe (e.g. FASOLA & BRACHETTI 1983, JERZAK 1988, 1997 and references therein) where Magpie preferred e.g. *Populus* spp., *Salix* spp., *Prunus* spp., *Crataegus* spp. and *Tilia* spp.. Such differences are surely related to the local species composition, frequency of occurrence of different trees and shrubs in the areas and different habitats (e.g. urban, rural) in the areas occupied by Magpies (see e.g. JERZAK 1988, 1997, GORSKA & GORSKI 1997).

Nest-height above ground depends on tree species (e.g. PRINZINGER & HUND 1981, KOOIKER 1995). The same was partly true also in my study area. The height of the nest varied significantly according to the tree species (Table 2). Nests were built significantly lower on bushes with thorns i.e. *Prunus spinosa* and *Crataegus* sp. than in coniferous and deciduous trees (Kruskal-Wallis test = 12.99, df = 2, $P < 0.001$). Similar results obtained also Vuorisalo et al. (1992), i.e. the lowest nests were found on the *Crataegus* spp.. However there are no significant differences according to height of nest between coniferous and deciduous trees (Mann-Whitney U test = 96.0, $P > 0.05$).

The nest height was with 5.7 m on average much lower than in northern Italy (FASOLA & BRICHETTI 1983) but similar to results obtained in Central Europe (JERZAK 1988 and references therein). TATNER (1982) and KOOIKER (1995) found in urban environments average nest heights of 13.8 m and 14.0 m respectively, which is almost the same as in Polish villages and towns (JERZAK 1988, 1997), whereas on the countryside the average nest height (4.1 m) is more resembling to my results. According to e.g. PRINZINGER & HUND (1981) disturbance is lower in non-urban environments. Anyway nesting success in my study area is low (see below).

3.2. Breeding biology

From a total of 30 nesting attempts observed on Dravsko polje 37% failed to fledge any young. Nests in which no eggs were laid are excluded from these data. Nesting success is low if we compare data with some other authors who studied the urban population of Magpie e.g. EDEN (1985), KAVANAGH et al. (1991), JERZAK (1995). Breeding success of the Magpie on Dravsko polje was also low compared with results obtained on some rural populations (e.g. BAEYENS 1981, EDEN 1985).

Table 2: Nest selection and nest height by the Magpie *Pica pica* on Dravsko polje in NE Slovenia.
Tab. 2: Neststandhöhen von Elsternestern in Nadel-, Laubbäumen und Dornsträuchern in Dravsko polje (NE-Slowenien).

	Coniferous trees	Deciduous trees	Bushes with thorns	Together
Average nest height (m)	6.0	7.2	3.6	5.7
SD	2.63	2.20	0.93	2.56
Min.	2.0	4.4	1.8	1.8
Max.	12.0	11.3	5.0	12.0
N	15	24	12	51

Whereas data are comparable with results of e.g. VINES (1981) and MØLLER (1982). Many authors suggest that Magpies like to nest close to humans because they are more protected from predators. HOWEVER, EDEN (1985) and KAVANAGH et al. (1991) pointed out that the urban environment is not a significantly better habitat, than the more traditional rural setting.

The most important cause of nesting failures is predation with 32% of losses which is very close to results of REDONDO & CASTRO (1992). The known causes of predation on Dravsko polje were: *Corvus cornix* (32%), man (26%), mustelids (11%), unknown (32%) (N = 19). *Corvus cornix* was also the most common predator of Magpie nests in Zielona Gora (JERZAK 1995). BIRKHEAD (1989) estimated that about 30% of all Magpie breeding attempts failed as a results of Carrion Crow predation which is similar to my results. Predation by mustelids is likely to be underestimated because these mammals are active by night and thus not easy to detect (JERZAK 1995). It is possible that domestic cats, which are common on this areas, were also predators of the Magpie nests. However, we must taken into account also the effects of ectoparasites in Magpies nesting (GUTIERREZ et al. 1982) which could influence on nestlings and future survival (e.g. MØLLER 1990, MERINO & POTTI 1995).

The undomed nests constituted 1.3% (N = 75) which is very low in comparison with results from JERZAK (1995). However the occurrence of undomed nests is very rare generally (GOODWIN, 1986). BAEYENS (1981) and BIRKHEAD (1989) suggested that the roof protects eggs and chicks from predators and that undomed nests are built by young inexperienced pairs.

The average clutch size was 6.0, SD = 0.93 (span 4–7, N = 28). The average clutch size are similar to other European areas (e.g. MÄCK 1991, JERZAK 1995 and references therein).

The mean ± SD for all the eggs measured was 33.6 ± 2.75 x 23.2 ± 0.69 mm (n = 80). The maxima for individual eggs were 37.8 x 23.7 and 32.7 x 25.3, the minima 30.4 x 23.3 and 31.9 x 21.7 mm. The average volume of eggs examined in northeastern Slovenia were 9.46 cm^3 , SD = 0.8 (span 7.86–11.1, N = 80) and the average egg shape index was 0.69, SD = 0.04 (span 0.59–0.77, N = 80). The average eggs dimensions in my study area were similar to that found by other authors in Central Europe (e.g. HUND & PRINZINGER 1981, WALTERS 1988, JERZAK 1995) and smaller than eggs in Asia (see JERZAK 1995).

4. Zusammenfassung

Die Untersuchungen an der Elster (*Pica pica*) wurden 1989–1991 und 1997 in der Region „Dravskopolje" (NE Slowenien) in einem 346 ha großen, landwirtschaftlich genutzten Gebietsraum durchgeführt. Die Siedlungsdichte betrug 1997 0,5 Paare/10 ha. Die überwiegende Anzahl der Nester war in *Pinus sylvestris* und Obstbäumen angelegt. Weitere Baumarten mit einer Bedeutung als Neststandort waren *Prunus spinosa* und *Alnus glutinosa* (Tab. 1). Die Neststandhöhe reichte von 2–12 m und variierte signifikant mit der Baum- oder Gehölzart (Tab. 2). Die niedrigsten Nester lagen in Dorngehölzen (Krukal-Wallis test = 12,99; df = 2; P < 0,001). Unterschiede in der Neststandhöhe zwischen Laub- und Nadelbaumstandorten konnten jedoch nicht gesichert werden (Mann-Whitney U test = 96,0; P > 0,05). Der Bruterfolg war mit nur 63% erfolgreicher Nester gering. Die häufigste Verlustursache mit 32% war Prädation, vorwiegend durch die Nebelkrähe *Corvus cornix*. Von allen Nestern (n = 75) waren 1,3% nicht überdacht. Die durchschnittliche Gelegegröße betrug 6,0; SD = 0,93 (n = 28). Die durchschnittliche Eigröße mit 33,6 ± 2,75 x 23,2 ± 0,69 mm (n = 80) entspricht etwa den in anderen Untersuchungen in Mitteleuropa ermittelten Maßen.

5. Literature

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