https://doi.org/10.34080/os.v17.22686

Goławski, A. 2006. [Breeding biology of the Red-backed Shrike *Lanius collurio* in extensive agricultural landscape of eastern Poland.] *Not. Orn.* 47: 1–10.
Gorban, I. M., Knysh, N. P. & Pogranychniy, V. A. 1998. Breeding ecology of Red-backed (*Lanius collorio*) and Great Grey Shrike (*L. excubitor*) in Ukraine. *IBCE Tech. Publ.* 7: 115.
Jakober, H. & Stauber, W. 1980. [Red-backed Shrike *Lanus collurio* as host of Cuckoo *Cuculus canorus.*] *Ökologie der Vögel* 2: 37– 41.
Tryjanowski, P. &, Kuźniak, S. 1999. Effect of research activity on the success of Red-backed Shrike *Lanius collurio* nests. *Ornis Fennica* 76:41–43.
Merliä, J. 1994. Two mixed clutches of Blue Tits *Parus caeruleus* and Collared Flycatchers *Ficedula albicollis*. *Ornis Svecica* 4: 188–189.
Moskát, C. & Fuisz, T. I. 1999. Reactions of Red-backed Shrikes *Lanius collurio* to artificial Cuckoo *Cuculus canorus eggs*. *J. Avian Biol.* 30:175–181.
Nowakowski, J. K., Nowakowski, W. K. & Mitrus, C. 1997. [Successful mixed broods of the Great Tit Parus major and Pied Flycatcher Ficedula hypoleuca.] *Not. Orn.* 38: 315–321.
Petrassi, F., Sorace, A., Tanda, F. & Consiglio, C. 1998. Mixed clutches of Blue Tits *Parus caeruleus* and Great Tits *Parus major* in nest boxes in Central Italy. *Ornis Svecica* 8: 49–52.

Sammanfattning

Den 8 juni 2006 påträffades en blandkull mellan törnskata *Lanius collurio* och taltrast *Turdus philomelos* nära Sielce i östra Polen. Kullen ruvades av en törnskatehona. I boet, som hade byggts av törnskata, fanns fyra ägg av törnskata och fem ägg av taltrast. Vid nästa bokontroll var kullen rövad av något däggdjur. Törnskator är känsliga för störningar och överger ofta sina kullar. De känner igen gökägg och avlägsnar dem från bona. Det förblir okänt varför törnskatan accepterade taltrastäggen.

Artur Goławski, Department of Zoology, University of Podlasie, Prusa 12, 08–110 Siedlce, Poland. E-mail: artgo1@ap.siedlce.pl

The bird assemblage in an extensive agricultural area during the non-breeding season in central Slovenia

Fågelsamhället i ett extensivt jordbruksområde utanför häckningstiden i centrala Slovenien

MILAN VOGRIN

Winter bird communities of terrestrial habitats have received far less attention than breeding bird communities. From Central Europe only a few studies have been published (e.g. Luniak 1980, 1981, Luniak et al. 1986, Biadun 1994, Kujawa 1995, Saniga 1995. The communities in agricultural areas are particularly poorly known (but see Moller 1984, Tiedemann 1993, Tryjanowski 1995). In Slovenia, for example, general information about the avifauna in the winter period has been provided only by Sovinc (1994). Therefore I investigated the winter bird community of an agricultural area in Central Slovenia. I was particularly interested in how the community composition and species densities changed during the winter months and if any relationships between species existed.

Study area

The study area is located in the Lower Savinja Valley (approximately 46°16' N, 15°07' E), about three km north-west of the town Žalec at 270 m above sea level, measures 67 ha, and is protected as a nature reserve. The area belongs to the prealpine phytogeographical zone (Marinček 1987). The main land use is intensive arable farming, mainly hops (Vogrin 2002). The only exception is this study area, which is dominated by meadows and cultivated grasslands with hedges and has a low density of arable fields. The dominant tree species are *Alnus glutinosa*, *Quercus robur* and *Salix* spp. The coppice layer comprises *Corylus avellana*, *Prunus spinosa* and *Frangula* spp. About 20% of the area consists of hedges. The hedges vary in height and width, but the majority are about 8–12 m high and about 4 m wide. Almost all hedges are trimmed irregularly. Along the small river Lozniča and meliorated canals there are wider belts of unmanaged hedges, uncut for probably more than 20–30 years. The area is crossed by a power line with towers. The landscape surrounding

the meadows is dominated by arable fields planted mainly with hop *Humulus lupulus*. Mixed woods and individual buildings also occurred in the surroundings landscape.

Methods

Fifteen surveys, three in each month about ten days apart were carried out after sunrise from October 1997 to February 1998. I used the line transect method as described by Bibby et al. (1992), Gibbons et al. (1996) and in more detail by Vogrin (2000). The transects covered the whole area, and all birds were recorded on a map of the area. Birds judged to be outside and those flying over the study area were not recorded. Rain and strong winds were avoided. The winter was mild with little or no snow.

The five most common species were analysed in detail: *Passer montanus*, *Fringilla coelebs*, *Corvus cornix*, *Pica pica* and *Parus major*. Relationships between densities were calculated for the ten most common species: *Passer montanus*, *Parus major*, *Parus caeruleus*, *Corvus cornix*, *Pica pica*, *Fringilla coelebs*, *Dendrocopus major*, *Erithacus rubecula*, *Troglodytes troglodytes*, and *Buteo buteo*. Statistical analyses were performed with Spearman correlation with the SPSS 8.0 statistical package. $P< 0.05$ was considered significant.

Results

During the whole period, 50 species were observed (Table 1) and two species, *Passer montanus* and *Fringilla coelebs*, were dominant (>5%). December had the lowest (17), and October the largest (34) number of species. During the study, the number of species decreased significantly ($r_s = -0.65$; $P< 0.01$; $n = 15$).

I found five significant relationships between species. Three of them were positive, i.e. *Parus caeruleus* vs. *Dendrocopus major*, *Passer montanus* vs. *Erithacus rubecula* and *Pica pica* vs. *Fringilla coelebs* ($r_s = 0.75$, $n = 7$; 0.72, $n = 9$; and 0.61, $n = 15$ respectively; in all cases: $P < 0.05$) and two were negative, i.e. *Corvus cornix* vs. *Dendrocopus major* and *Corvus cornix* vs. *Parus caeruleus* ($r_s = -0.86$, $n = 8$, $P < 0.005$ and -0.64, $n = 10$, $P < 0.05$ respectively).

Discussion

In a 100 ha agricultural area in Schleswig-Holstein, Germany, Tiedemann (1993) found 28 species between October and December. In western Poland Tryjanowski (1995) registered 39 species on cultivated fields between November and March during six years. In comparison with other similar areas in Central Europe (see Table 5 in Tryjanowski 1995) my study area hosted a very high number of species (see also Lentner & Landmann 1994 for comparison). Tryjanowski (1995) doubts that the geographic location has a significant influence on the size of bird populations wintering in Central Europe. However, the Lower Savinja Valley is located south of all other areas mentioned in Table 5 of Tryjanowski (1995). The main reason for the high number of species and individuals observed in my study area is probably high availability of food (see Farina 1989, Tiedemann 1993, Tryjanowski 1995).

During the breeding season hedgerows offer protection, food and sheltered nest sites (e.g. Van Dorp & Opdam 1987). Hedges also serve as corridors (e.g. Hobbs 1992, Hinsley et al. 1995, Bellamy et al. 1996) for movement between habitats. Hedges may serve as good foraging and protection patches also during the non-breeding season (Moller 1984, Kujawa 1995, Tryjanowski 1995). The surrounding habitats might also influence bird species richness (for breeding species see e.g. Hinsley et al. 1995) since many species occupy a wider range of habitats during the non-breeding than during the breeding season (Bilcke 1984).

During December and January the bird assemblage consisted exclusively of sedentary species. Only in October, November and February did individuals of late (e.g. *Phylloscopus collybita*, *Saxicola torquata*, *Phoenicurus ochruros*) and early (*Sturnus vulgaris*) migrants occur.

The differences between the results of my study and those previously reported by Tiedemann (1993) probably depend on habitat differences (e.g. Donald et al. 1997), different years, meteorological conditions (Tryjanowski 1995; pers. obs.) and different surrounding landscapes (Kujawa 1995; see above).

The number of observed individuals varied greatly in four of the five most common species. Only in *Corvus cornix* the numbers of observed individuals was more or less stable throughout the winter. The number of species significantly decreased during the winter, which was also found by Tiedemann (1993) in Germany.

Among the 45 pairwise comparisons between the 10 most common species, only 5 (11%) were statistically significant. Thus, in my study area, winter population sizes of different species changed to a large extent independently. There are two conge-

Table 1. The 1997/1998 winter bird assemblage of Lower Savinja valley, Central Slovenia.
Numbers presented are the percentage of different bird species observed in the different months. A + sign indicates that only one observation was made of that species.
Fågelsamhällets sammansättning i nedre Savinjadalen, centrala Slovenien, vintern 1997/1998. Värdena i tabellen är procentandelen för de olika arterna. Ett + anger att endast en individ registrerats.

Species	Oct	Nov	Dec	Jan	Feb
Passer montanus	22.8	22.1	17.2	41.6	11.2
Phylloscopus collybita	9.7	+	-	-	-
Carduelis carduelis	9.1	+	-	-	-
Carduelis spinus	7.3	26.7	42.0	+	-
Fringilla coelebs	6.7	12.2	10.6	18.5	48.5
Corvus cornix	6.1	2.6	3.9	6.6	8.9
Pica pica	5.8	4.6	4.3	12.8	20.1
Columba palumbus	4.2	-	-	-	-
Parus major	3.6	8.4	9.8	6.6	13.4
Turdus philomelos	2.7	+	-	-	-
Anthus spinoletta	2.4	-	-	-	-
Prunella modularis	2.1	0.3	-	+	-
Regulus ignicapillus	2.1	-	-	-	-
Erithacus rubecula	1.8	2.3	+	-	2.2
Saxicola torquata	1.5	-	-	-	-
Turdus merula	1.5	+	-	+	+
Phoenicurus ochruros	1.2	-	-	-	-
Buteo buteo	1.2	0.9	1.2	2.1	2.2
Falco tinnunculus	1.2	0.6	-	-	+
Motacilla alba	0.9	-	-	-	-
Sylvia atricapilla	0.9	-	-	-	-
Parus caeruleus	0.6	3.5	2.0	+	+
Dendrocopos major	0.6	1.2	+	1.2	-
Alcedo atthis	0.6	-	-	-	-
Acrocephalus schoenobaenus	+	-	-	-	-
Anthus pratensis	+	-	-	-	-
Troglodytes troglodytes	+	2.9	2.3	1.2	3.7
Ardea cinerea	+	-	-	-	2.2
Serinus serinus	+	-	-	-	-
Garrulus glandarius	+	+	-	+	3.0
Falco peregrinus	+	-	-	-	-
Accipiter nisus	+	0.6	+	-	-
Corvus corax	+	-	-	0.8	-
Phasianus colchicus	+	-	-	-	-
Parus palustris	-	0.9	+	+	+
Carduelis chloris	-	+	-	-	8.2
Picus viridis	-	+	-	+	-
Anas platyrhynchos	-	+	-	-	-
Aegithalos caudatus	-	+	+	-	-
Remiz pendulinus	-	+	-	-	-
Turdus pilaris	-	+	-	-	-
Fringilla montifringilla	-	+	+	-	-
Sitta europea	-	-	+	+	-
Pyrrhula pyrrhula	-	-	+	-	-
Picus canus	-	-	-	0.8	-
Emberiza citrinella	-	-	-	1.6	-
Loxia curvirostra	-	-	-	+	-
Passer domesticus	-	-	-	-	14.9
Turdus viscivorus	-	-	-	-	+
Sturnus vulgaris	-	-	-	-	+
No. of species	34	27	17	20	18

neric species pairs in our data set (*Corvus cornix* and *Pica pica*, *Parus major* and *Parus caeruleus*) with the species co-occurring in the same habitats, but their numbers were not negatively correlated as could have been expected because of competition.

The winter density of Blue and Great Tits in western Europe is so high that they compete for roosting sites (e.g. Dhondt & Eykerman 1980), and they also compete for food (e.g. Minot 1981, Torok 1993, Cramp & Perrins 1993). Therefore we expected a negative relationship between them, but the relationship was positive, although not significant ($r_s = 0.19$, $n = 10$, n.s.). This could be due to lower densities of both species in my study area (between 0.60–1.84 individuals/10 ha of *Parus major*, 0.15–0.60 ind./10 ha of P. caeruleus; Vogrin 2000) in comparisons with western Europe (e.g. Cramp & Perrins 1993).

It is interesting that all relationships between *Corvus cornix* and all small birds were negative, whereas those between *Pica pica* and small birds were positive. Both corvids are nest predators of small birds (e.g. Cramp & Perrins 1994, Vogrin 1997). But corvids should have no effect on small birds in the non-breeding season. Maybe some other reasons, like habitat preferences or food are involved.

Acknowledgements

The work could not have been carried out without the considerable help of the municipality Žalec.

References

Bellamy, P., Hinsley, S.A. & Newton, I. 1996. Local extinctions and recolonisations of passerine bird populations in small woods. *Oecologia* 108: 64–71.

Bibby, J.C., Burges, D.N. & Hill, A.D. 1992. *Bird census techniques*. Academic Press, London. 257p.

Bilcke, G. 1984. Seasonal changes in habitat use of resident passerines. *Ardea* 72: 95–99.

Cramp, S. & Perrins, C.M. (eds) 1993. *The Birds of the Western Palearctic. Handbook of the Birds of Europe, the Middle East and North Africa.* Vol. 7. Oxford University Press. 577p.

Dhondt, A. A. & Eyckerman, R. 1980. Competition between the great tit and the blue tit outside the breeding season in field experiments. *Ecology* 61: 1291–1296.

Donald, F.P., Haycock, D. & Fuller, J.R. 1997. Winter bird communities in forest plantations in western England and their response to vegetation, growth stage and grazing. *Bird Study* 44: 206–219.

Farina, A. 1989. Bird community patterns in Mediterranean farmlands: a comment. *Agric. Ecosystems Environ.* 27: 177–181.

Gibbons, W.D., Hill, D. & Sutherland, J.W. 1996. Birds, pp. 227–259 in *Ecological Census Techniques. A handbook.* (Sutherland, J.W., ed.) Cambridge University Press.

Hinsley, S.A., Bellamy, P.E., Newton, I. & Sparks, T.H. 1995 Habitat and landscape factors influencing the presence of individual breeding species in woodland fragments. *J. Avian Biol.* 26: 94–104.

Hobbs, R.J. 1992. The role of corridors in conservation: Solution or bandwagon? *Trends Ecol. Evol.* 7: 389–392.

Kujawa, K. 1995. Composition and dynamics of wintering bird communities in mid-field woods and woodbelts in Turew (western Poland). *Acta Orn.* 29: 145–154.

Lentner, R. & Lansmann, A. 1994. Vogelwelt und Struktur der Kulturlandschaft: räumliche und saisonale Muster. *Berichte des Naturwissenschaftlich-Medizinischen Vereins in Innsbruck, Supplementum* 12: 1–130.

Marinček, L. 1987. *Bukovi gozdovi na Slovenskem. Delavska enotnost.* Ljubljana. 150 pp.

Minot, E.O. 1981. Effects of interspecific competition for food in breeding blue and great tits. *J. Anim. Ecol.* 50: 375–385.

Moller, A.P. 1984. Community structure of birds in agricultural areas in summer and winter in Denmark. *Holarctic Ecology* 7: 413–418.

Sovinc, A. 1994. *The Atlas of Wintering Birds in Slovenia. Tehniška založba Slovenije.* Ljubljana. In Slovene with English summary. 452 pp.

Tiedemann, R. 1993. Fluktuationen im Vogelbestand einer schleswig-holsteinnischen Knicklandschaft bei Winterreinbruch - Ergebnisse einer Linientaxierung. *Corax* 15: 197–202.

Torok, J. 1993. The predator-prey size hypothesis in three assemblages of forest birds. *Oecologia* 95: 474–478.

Tryjanowski, P. 1995. The composition and dynamics of a wintering bird community in an agricultural area of western Poland. *Acta Orn.* 30: 153–160.

Van Dorp, D. & Opdam, P.F.M. 1987. Effects of patch size, isolation and regional abundance on forest bird communities. *Landscape Ecology* 1: 59–73.

Vogrin, M. 1997. Magpie *Pica pica* preying on passerines. *Acrocephalus* 18: 107–110. In Slovene with English summary.

Vogrin, M. 2000. Composition of wintering bird assemblages on meadows with hedges in the Lower Savinja Valley (Slovenia). *Gozdarski vestnik* 58: 304–315. In Slovene with English summary.

Vogrin, M. 2002. Breeding birds in hop fields. *Ornis Svecica* 12: 92–94

Sammanfattning

Landmiljöernas fågelsamhällen är betydligt sämre studerade vintertid än under häckningstiden. Det gäller även i Slovenien och är speciellt påtagligt för jordbrukslandskapets fåglar. Därför inventerade jag ett extensivt brukat jordbruksområde i nedre Savinjadalen i centrala Slovenien mellan oktober 1997 och februari 1998. Inventeringsområdet mätte 67 ha och utgjordes av betesmarker och vall, men få odlade fält. Området hade stor rikedom på häckar av olika bredd och höjd. Det fanns också ett vat-

tendrag med strandskog. Runt området dominerade intensivt odlade fält med i huvudsak humle.

Jag gjorde femton inventeringar, tre varje månad ungefär tio dagar isär. Jag täckte hela området med linjer och antecknade alla fåglar på en karta över området. De fem vanligaste arterna analyserades mer i detalj (pilfink, bofink, kråka, skata och talgoxe). Artjämförelser gjordes mellan de tio vanligaste arterna, d.v.s. de nyssnämnda plus blåmes, större hackspett, rödhake, gärdsmyg och ormvråk. Arterna jämfördes med Spearman rang-korrelation.

Inventeringsresultatet framgår av Tabell 1. Totalt noterades 50 arter. Lägst artantal noterades i december (17) och högst i oktober (34). Under studiens lopp sjönk artantalet signifikant. Jag fann fem signifikanta relationer mellan artpar. Tre av dem var positiva (blåmes/större hackspett, pilfink/rödhake och skata/bofink) och två var negativa (kråka/större hackspett och kråka/blåmes).

Jämfört med andra inventeringar vintertid i Centraleuropa var artantalet i mitt område betydligt högre. En författare (Tryjanowski 1995) har hävdat att olika centraleuropeiska områden inte skulle skilja sig i artantal vintertid. Mitt område, som ligger söder om de övriga inventerade områdena, avviker uppenbarligen, vilket förmodligen beror på att det har ett stort utbud av föda åt fåglarna. De fördelar som riklig förekomst av häckar har på födotillgång och skydd under häckningstiden finns säkert också utanför häckningssäsongen. Under december–januari bestod fågelsamhället enbart av stannfåglar, men tidigare månader noterades sena flyttare (gransångare, svarthakad buskskvätta och svart rödstjärt) och i februari tidigt ankommande starar.

Det var stora variationer i antalet individer hos fyra av de fem vanligaste arterna och endast kråkan hade ungefär samma antal vintern igenom. Av de 45 möjliga parvisa testerna för de tio vanligaste arterna, var endast fem signifikanta. Det visar att arterna varierar i antal oberoende av varandra. Det fanns två artpar inom samma släkten (kråka/skata och talgoxe/blåmes). Dessa skulle kunna tänkas konkurrera med varandra och därför uppvisa negativ korrelation. I stället var sambanden positiva, om än inte signifikanta. För mesarna kan detta möjligen bero på att deras täthet i detta område är väsentligt lägre än i västra Europa där konkurrens registrerats. Märkligt nog visade det sig att korrelationerna mellan kråka och alla småfåglar var negativa medan de mellan skata och småfåglar var positiva. Båda kråkfåglarna är bopredatorer på småfåglar, men detta borde inte ha någon betydelse vintertid. Det förblir okänt varför dessa samband erhölls.

Milan Vogrin, Zg. Hajdina 83c, SI-2288 Hajdina, Slovenia, e-mail: milan.vogrin@guest.arnes.si