Breeding bird communities of a pine *Vaccinio – Vitis idaeae – Pinetum* and beech *Luzulo – Fagetum, Blechmo – Fagetum* forests in Lower Savinja valley (Slovenia)

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Zusammenfassung

Die Forschung wurde in den Wäldern am Rand des Karstplateaus Dobrovlje im unteren Savinja-Tal (Slowenien) durchgeführt. Der erste Wald gehört zur Phytozönose *Luzulo – Fagetum, Blechmo – Fagetum* (30.8 ha), während der zweite Wald zur Phytozönose *Vaccinio – Vitis idaeae – Pinetum* (29.5 ha) gehört.

Vom Buchenwald wurde ein Gesamtvorkommen von 26 Arten berichtet, während es im Föhrenwald 25 Arten sind. Sechs brütende Arten sind neu für diesen Teil des Landes. Die Brutpopulationen von Buchen- und Föhrenwäldern waren einander ähnlich (Dichte-Ähnlichkeits-Index war 63%). Die Unterschiede zwischen Probeflächen entsprechend Brutdichten (Mann-Whitney U Test = 300.0) und der Biomasse (Mann-Whitney U Test = 316.5) sind nicht signifikant.

A map of Slovenia with market research areas

Summary

Research was carried out in the forests at the edge of karst plateau Dobrovlje in Lower Savinja valley (Slovenia). The first forest belongs to phytocenosis *Luzulo – Fagetum, Blechmo – Fagetum* (30.8 ha), whereas the second forest belongs to phytocenosis *Vaccinio – Vitis idaeae – Pinetum* (29.5 ha). A total of 26 species were reported to occur in beech forest, whereas a 25 species were reported to occur in pine forest. Six breeding species are new for this part of the country. The breeding populations of beech and pine forests were similar to each other (density similarity index was 63%). The differences between study plots according to breeding densities (Mann-Whitney U test = 300.0) and biomass (Mann-Whitney U test = 316.5) are not significant.

Introduction

In Slovenia quantitative studies of bird communities are infrequent, what is specially true for woodland areas. To date, breeding communities of birds inhabit forests have only been described by PERUŠEK (1992) and VOGRIN (1997).

The main aim of this paper is to present breeding birds of two forest plots and to compare some quantitative data between them.

Study area

The study area is situated in the Lower Savinja Valley near Žovnek reservoir (plot 1) and on karst plateau Dobrovlje (plot 2). According to MARINČEK (1987) the area belongs to prealpine phytogeographical region. Research area was selected without prior knowledge of birds' density.

The first plot belongs to phytocenosis *Vaccinio – Vitis idaeae – Pinetum* and measured 29.,5 ha (Zavod za gozdove Slovenije, OE Celje, 1992) whereas the second plot belongs to phytocenosis *Luzulo – Fagetum and Blechmo – Fagetum* forest and measured 30.8 ha (Zavod za gozdove Slovenije, OE Celje, 1992). The main species forming the forests under study was present in Table 1. Both study plots were approximately the same ages. For detail description of the study area see VOGRIN (1997) and VOGRIN (1998).

Methods

The bird communities were censused by territory mapping BIBBY et al. 1992, GIBBONS et al. 1996) on calm, dry mornings. The censuses were carried out at least 8 times in a breeding season (April–June). One visit was performed in the evening for mapping dusk active birds. See VOGRIN (1997) for details.

For analysis, the bird community has been split into three ecological groups: according to nesting guilds according to feeding habits and according to migratory habits mainly following e.g. TOMIALOJČ et al. (1984).

For comparisons of similarities between bird assemblages I used the density similarity index (TOMIALOJČ & WESOLOWSKI 1991):

$DS\ (\%) = 2 \sum \min (d_{1i}, d_{2i}) / D_1 + D_2 \times 100$

where d_{1i} and d_{2i} are the densities of the i-th species in the assemblages 1 and 2, and D_1 and D_2 are total densities of assemblages 1and 2 respectively. The index varies between 0 (no species in common) and 100 (identical densities of all species).

The body mass of bird species were extracted from the literature (CRAMP & PERRINS 1994, KOOIKER 1994).

Chi-square and Mann-Whitney U tests were used for statistic comparison (SOKAL & ROHLF 1995). All statistical tests were performed with the SPSS (Statistical Package for the Social Sciences) 6.0 statistical package. A P-value < 0.05 was considered significant.

Results and discussion

Detailed descriptions of the bird communities are given in VOGRIN (1997) and VOGRIN (1998). Here I present some new details and analyses.

According to GEISTER (1995) data for *Regulus ignicapillus, Coccothraustes coccothraustes, Muscicapa striata, Phylloscopus*

Tree species	*Vaccinio – Vitis idaeae – Pinetum* Plot 1	*Luzulo – Fagetum*	*Blechmo – Fagetum* Plot 2
Picea abies	50	14	8
Pinus sylvestris	35	20	10
Fagus sylvatica	-	40	50
Querqus petraea	5	15	24
Castanea sativa	-	-	6

Table 1:The main tree species in % forming the forests on research areas in Lower Savinja Valley

Species	*Vaccinio – Vitis idaeae – Pinetum*	B	*Luzulo – Fagetum Blechno – Fagetum*	B
Regulus regulus	+	150	-	-
Erithacus rubecula	+	420	+	300
Parus ater	+	288	+	288
Sylvia atricapilla	+	418	+	342
Phylloscopus collybita	+	144	+	96
Regulus ignicapillus	+	70	-	-
Fringilla coelebs	+	288	+	432
Turdus philomelos	+	840	+	700
Turdus merula	+	870	+	696
Certhia familiaris	+	64	+	16
Oriolus oriolus	+	276	+	276
Garrulus glandarius	+	640	+	320
Streptopelia turtur	+	560	+	280
Sitta europaea	+	46	+	276
Parus major	+	38	+	266
Parus cristatus	+	26	+	26
Parus palustris	+	22	+	22
Anthus trivialis	+	42	-	-
Parus caeruleus	+	22	+	66
Turdus viscivorus	+	210	+	220
Coccothraustes coccothraustes	+	110	+	110
Muscicapa striata	+	34	-	-
Emberiza citrinella	+	60	-	-
Columba palumbus	+	960	+	960
Dendrocopus major	+	146	+	146
Troglodytes troglodytes	-	-	+	90
Phylloscopus sibilatrix	-	-	+	36
Phoenicurus phoenicurus	-	-	+	30
Pyrrhula pyrrhula	-	-	+	48
Jynx torquilla	-	-	+	70
Picus canus	-	-	+	290
Buteo buteo	*	-	*	-
Strix aluco	*	-	-	-
Accipiter nisus	*	-	-	-
Corvus cornix	*	-	-	-
Sturnus vulgaris	*	-	-	-
Cuculus canorus	-	-	*	-
Drycopus martius	-	-	*	-
Corvus corax	-	-	*	-
Total biomass	-	6744	-	6402
Biomass (g/10 ha)	2286	-	2078	-
No. of breeding species	25	-	26	-
Density (pairs/10 ha)	35.6	-	30.2	-

*Table 2: Breeding birds in the forests where research was done: + = breeding species, * = presence, but not breeding on the research plot, B = total biomass (g)*

sibilatrix, Pyrhulla pyrhulla and *Jynx torquilla* are new for this part of the country. However breeding data in the Lower Savinja Valley for *Muscicapa striata* and *Jynx torquilla* was previous described by VOGRIN (1996). Both species were breeding on extensive agricultural area (meadows, hedges) near town Žalec.

The composition of the bird communities in the two forest habitats is shown in Table 2. A total of 31 breeding bird species were found on both plots. Among them, four species (*Streptopelia turtur, Phoenicurus phoenicurus, Jynx torquilla* and *Picus canus*) belong to the endangered breeding species in Slovenia (BRAČKO et al. 1994). Out of the total number of 31 species acknowledged as breeding in the plots studied, as many as 20 nested in both plots.

The species compositions of the birds nesting in the two plots were similar (density similarity index = 63%). The differences between densities of bird occurring in two sample plots were not significant (Mann-Whitney U test = 300.0, $P > 0.05$). The abundance of the community of the birds in respect to their biomass is 2286 g/10 ha in plot 1 and 2078 g/10 ha in plot 2. The differences between bird communities according to their biomass were not significant (Mann-Whitney U test = 316.5, $P > 0.05$). The differences between plots were not significant either in numbers according to their ecological groups (Chi-square test).

An analysis of the bird communities described from plot 1 and 2 shows that in respect of the size of number of species, number of breeding pairs, density and biomass are very similar.

The bird communities, living in coniferous or mixed coniferous-deciduous forests, that is, in coniferous stands or mixed stands with prevailing conifers, observed in the Central Europe (e.g. SLIZOWSKI 1991, KRIŠTIN 1990, PECHACEK 1994, SANIGA 1995), had similar numbers of species and, for the most part, higher levels of density of pairs than in my study area on plot 1. On the other hand OELKE (1980), GLOWACINSKI 1990, GLOWACINSKI & PROFUS (1992) obtained similar results as I.

The density of breeding pairs in beech forest was lower than densities obtained in similar forest type in Central Europe (SCHAFFNER 1990, CICHON & ZAJAC 1991, KIEŠ 1991, BÜRGER & KLOUBEC 1994) nevertheless the numbers of breeding species were more similar.

Why are bird densities in both study plots so low? The amount of competition that occurs between individuals for limited resources is one of the most important factors to be considered when predicting the density (as well as distribution) of animals (e.g. MILINSKI & PARKER 1991). However food abundance (e.g. seeds, caterpillars) on research areas was not counted or measured. Other reasons for relatively low densities could be predator (e.g. mammals) pressure (WESOLOWSKI & TOMIALOJČ 1997), as the rodents themselves were important nest predators (e.g. PIOTROWSKA & WESOLOWSKI 1989, TOMIALOJČ 1995). Since share of ground nesters were low on both plots, predators could be important regulators of bird density (see also MARTIN 1992, 1995). Nevertheless, we must take into account also year to year fluctuations, which is common in most small-bird populations, especially in seed eating birds (NEWTON 1998 and references therein).

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