Artur GOŁAWSKI

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

DOES THE RED-BACKED SHRIKE (LANIUS COLLURIO L.) BENEFIT FROM NESTING IN THE ASSOCIATION WITH THE BARRED WARBLER (SYLVIA NISORIA BECHST.)?

ABSTRACT: The co-occurrence of Red-backed Shrikes (Lanius collurio) and Barred Warblers (Sylvia nisoria) was monitored during the years 1999–2003 at 343 ha of agricultural landscape of eastern Poland. Each year 25–31 pairs of Red-backed Shrikes and 3–8 pairs of Barred Warblers were nesting. In total, during five seasons, shrikes were nesting in the vicinity (within 50 m from the centre of the Barred Warbler territory) of 22 out of 24 (92%) warbler territories. The breeding success of the pairs nesting close to Barred Warbler territories was 89%, as compared with 61% for the remaining pairs and it was statistically significant. No difference was found in the clutch size between Red-backed Shrikes nesting close to Barred Warblers and far from them, but statistically significant difference was found in numbers of fledglings between them. The present results imply that close nesting of these two species reduces the risk of nest predation. This may be due to the aggression of Barred Warblers towards potential predators, as this species actively attacks predators near the nest.

KEY WORDS: Lanius collurio, Sylvia nisoria, breeding associations, anti-predator nesting strategy
The study was carried out near Siedlce, eastern Poland (52°12′N; 22°17′E) in 1999–2003. The study area consisted of 343 ha of agricultural landscape. Arable fields predominated in this area (45%), mainly with crops of rye and potatoes. Drained hay meadows and pastures covered 20%, and the proportion of fallow land was 4%. Besides these open habitats, there were also woodlands (13%) and orchards (13%). The structure of the land use did not change during the study period.

Red-backed Shrike nests were visited at 5–8-day intervals. Clutch size was noted early in the incubation. Number of nestlings was checked on days 8–9, as later they can jump off the nest (Kuźniak 1991). After the expected date of fledging (day 15 of life; young stay in the vicinity of the nest for 3–4 weeks), nests were monitored. They were considered to be successful if at least one nestling fledged (Kuźniak 1991). Only the nests lost due to predation were analysed. The nests lost for other reasons were excluded. Among them those abandoned by shrikes were the second most important source of nest failure (Goławski 2006).

The sites occupied by Barred Warblers were defined as those with at least two records of this species in the breeding season. It was assumed that Red-backed Shrikes nested in association (close) with Barred Warblers when the Red-backed Shrike nest was located within 50 m from the centre of the Barred Warbler territory (based on several records). The surface area of a circle with this radius was considered as a Barred Warbler territory by other authors (Walde

Data were analysed using the chi-square test and Mann-Whitney test (Sokal and Rohlf 2001). All tests are two-tailed, and a probability of \( P = 0.05 \) was taken to indicate significance. All statistics were calculated with the program Statistica (StatSoft 2003).

Each year in the period 1999–2003, 25–31 (total 139) pairs of Red-backed Shrikes and 3–8 (total 24) pairs of Barred Warblers were nesting. In total, during five seasons, shrikes were nesting in the vicinity of 22 out of 24 (92%) warbler territories. Only two territories were occupied by Barred Warblers alone, i.e. the nest of the Red-backed Shrikes was in distance more than 50 m from warbler’s territory centre.

During the study period, 91 Red-backed Shrike nests were found, including 19 near Barred Warbler territories and 72 far from their territories. The breeding success of the pairs nesting close to Barred Warbler territories was 89%, as compared with 61% for the remaining pairs, the difference being statistically significant (\( \chi^2 \) with Yates correction = 4.26, \( \text{df} = 1, \ P = 0.039 \)). No difference was found in the clutch size between Red-backed Shrikes nesting close to Barred Warblers (mean = 5.4) and far from them (mean = 5.5, Mann-Whitney test, \( z_{69} = 0.17, \ P = 0.862 \)). Broods of shrikes nesting near warblers contained 4.1 fledglings on average as compared with 2.7 fledglings for shrikes nesting far from warblers, the difference being statistically significant (Mann-Whitney test, \( z_{82} = 2.14, \ P = 0.032 \)). The number of fledglings per successful pairs was 4.7 for shrikes nesting close to warblers, and 4.5 for those nesting far from warblers, the difference being not significant (Mann-Whitney test, \( z_{53} = 0.71, \ P = 0.481 \)).

Table 1. The comparison of the breeding parameters (mean ± SD) between nests of Red-backed Shrikes in distance less than 50 m and more than 50 m from territory’s centre of Barred Warbler (BW) on the study plot (343 ha) in eastern Poland.

<table>
<thead>
<tr>
<th>Nest’s category</th>
<th>Breeding success</th>
<th>Clutch size</th>
<th>Fledglings number per breeding pairs</th>
<th>Fledglings number per successful pairs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less then 50 m to territories of BW</td>
<td>89% (n = 19)</td>
<td>5.4 ± 0.8 (n = 14)</td>
<td>4.1 ± 2.0 (n = 16)</td>
<td>4.7 ± 1.3 (n = 14)</td>
</tr>
<tr>
<td>More then 50 m from territories of BW</td>
<td>61% (n = 72)</td>
<td>5.5 ± 0.9 (n = 57)</td>
<td>2.7 ± 2.4 (n = 68)</td>
<td>4.5 ± 1.1 (n = 41)</td>
</tr>
</tbody>
</table>
Co-occurrence of Red-backed Shrikes and Barred Warblers has been known for many years (Schmidt 1981, Cramp 1992, Neuschulz 1997). In the present study about 10–25%, depending on the season, of Red-backed Shrikes nested in association with Barred Warblers, which is similar to or less than reported from different parts of Germany (a review in Bräunlich and Otto 1997) and from western Poland (Kuźniak et al. 2001).

For successful nests no differences were found in the clutch size and number of fledglings between Red-backed Shrikes nesting in association with Barred Warblers and those nesting alone. However, shrikes nesting in the vicinity of Barred Warblers had a higher breeding success and, consequently, produced more fledglings. The difference was 1.4 fledglings per breeding pairs. As most of the total nest losses are caused by predators (Ricklefs 1969), the present results imply that close nesting of these two species reduces the risk of nest predation. This may be due to the aggression of Barred Warblers towards potential predators, as this species actively attacks predators near the nest (Cramp 1992, author’s unpublished data). In this case, both these species could mutually benefit from the defence of their nests located close to one another (Nankinov and Darakchiev 1979, Cramp 1992). Red-backed Shrikes themselves can vigorously attack predators. Aggressive pairs (towards an observer) were more successful and produced more fledglings than the pairs not defending their nests (Tryjanowski and Golawski 2004).

Close nesting of Red-backed Shrikes and Barred Warblers has so far been ascribed to similar habitat preferences of the two species (Gotzman 1965, Schönfeld 1998, Kuźniak et al. 2001). General benefits of the close nesting and common response to predators by the two species are discussed by Nankinov and Darakchiev (1979). According to Neuschulz (1988) and Cramp (1992), breeding success of Barred Warblers nesting close to Red-backed Shrikes is higher than for Barred Warblers nesting alone. The two views are not necessarily exclusive. These species are closely associated because of similar habitat preferences. As both are aggressive towards predators, they both may benefit from nesting in vicinity (Orians and WIlson 1964).

There are no literature data on possible differences in breeding success of Red-backed Shrikes nesting near Barred Warblers and far from them. Such data are easier to collect for shrikes than for warblers as, typically, the former are much more abundant than the latter. Besides, many pairs are nesting far from Barred Warblers, whereas Barred Warblers are most often nesting near Red-backed Shrikes, and pairs nesting alone are noted on rare occasions. In particular, this is the case of the birds living in agricultural landscapes, where suitable habitats are scattered in patches, and almost all Barred Warblers co-occur with Red-backed Shrikes (Kuźniak et al. 2001, author’s unpublished data). To decide the problem of the co-occurrence of Red-backed Shrike and Barred Warbler and the possible advantages to both these species, their breeding success should be examined in association and in isolation within a selected area. So far, such data are lacking, in part due to the rare and geographically limited occurrence of the Barred Warbler.

ACKNOWLEDGEMENTS: I am grateful to Cezary Mitrus, Andrzej Dombrowski and an anonymous reviewer for comments on the manuscript.

REFERENCES


Durango S. 1949 – The nesting association of birds with social insects and with birds of different species – Ibis, 91: 140–143.

Erwin M.R. 1979 – Species interactions in a mixed colony of common terns (Sterna hirundo) and black skimmers (Rynchops niger) – Anim. Behav. 27: 1054–1062.


Isenmann P., Fradet G. 1995 – Is the nesting association between the Orphean Warbler (Sylvia hortensis) and the Woodchat Shrike (Lanius senator) an anti-predator oriented mutualism – J. Ornithol. 136: 288–291.


(Received after revising February 2007)