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EFFECT OF HABITAT ON THE DIET OF REED WARBLER (ACROCEPHALUS SCIRPACEUS) NESTLINGS

Tomáš GRIM and Marcel HONZA

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Institute of Landscape Ecology, Academy of Sciences of the Czech Republic, Brno

A b s t r a c t

The diet of reed warblers (*Acrocephalus scirpaceus*) was studied in reed-beds in the Southern-eastern part of the Czech Republic. Food samples were collected when placing neck collars on nestlings in the breeding season of 1994. From 94 food samples were obtained 708 prey items. Diptera (66.5%), Homoptera (12.7%) and Aranea (7.2%) were the predominant food types observed, and the average body length of the prey was found to be 8.0 mm (1.9-21.0 mm). The total diversity of food was H' = 1.109, and J = 0.446. Food composition between two studied plots was significantly different.

Key words: *Acrocephalus scirpaceus*, nestlings, diet analysis

Introduction

The diet composition of reed warbler nestlings has been studied previously by D a v i e s & G r e e n (1976), H e n r y (1979), D y r c z (1979), V a l i u s et al. (1986), B u s s m a n n (1979), C s ö r g ő (1983) and some details of day-to-day variation in food composition have been published by H e n r y (1977, 1978). Both D y r c z (1979) and B i b b y & T h o m a s (1985) have shown that habitat differences have an impact on variation within the diet. In addition, the feeding behaviour and also feeding techniques of reed warblers have been studied by e.g. G r e e n & D a v i e s (1972) and D a v i e s & G r e e n (1976). However, as current knowledge on the food of nestlings from middle Europe is still scarce, the main aim of the present investigation was to evaluate the effect of habitat on the composition and variability of food brought to nestlings at two nest sites in the Czech Republic.

Study Area and Methods

Sampling was undertaken from 28 June to 15 July 1994 at the Mlýnský fishpond (107 ha), near the village of Lednice (47°48'N; 16°48'E) in the South-eastern part of the Czech Republic. Reed warbler breeding sites were only situated in reed -beds (*Phragmites australis*) on the shores of this pond. The pond was surrounded by arable land, but separated from agricultural fields by a zone of old parkland and old oak forest. For more details about the study area, see H u d e c (1975). To evaluate whether there were differences in food composition, two sites were selected for observation:

1) North shore: Nests were located more than 60 m from the nearest trees and less than 5 m from the open edge of the reed bed. All the nests were over dry ground because the pond was partially flooded. Feeding took place on plants growing in dry mud, feeding flights to trees were never observed.

2) South shore: Nests were located less than 10 m from the nearest trees. As on North shore, all the nests were over dry ground. Feeding flights to trees were very frequent. All samples were collected between the hours of 05:50 and 21:00 when placing neck-collars. Sampling was under-taken under constant weather conditions, therefore effectively excluding weather as a factor influencing food composition. The term food sample refers to content of crop of one nestling. The neck-collar was placed on nestling within one hour.

The diet composition was evaluated using the following criteria: abundance, dominance, frequency, overall diversity index (Shannon & Weaver 1949), overall equitability index (Sheldon 1969). These indexes were calculated to the order level. Differences between percentage values was tested by the „z" test (Malý 1962). The difference between the length of food items taken was tested by t-test.

Results and Discussion

The overall diet of reed warbler nestlings was found to contain 708 prey items (15 orders of invertebrate) based on 94 food samples from 15 nests. The main dietary component by relative precentage were Diptera (D = 66.5%), from suborder Nematocera almost Chironomidae (D = 35.5%), from suborder Brachycera then Syrphidae (D = 7.6%). These results are very similar to those reported elsewhere. Diptera were also predominant in studies from England (Davies & Green 1976), Poland (Dyrcz 1979), Lithuania (Valius et al. 1986), Switzerland (Dyrcz 1979), and France (Bussmann 1979). Other dominant food items were Homoptera (12.7%) and Aranea (7.2%). From order Homoptera were the most dominant Aphidinea (9.4%). Diptera were also the most frequently observed order, occurring in 99% of the samples, followed by Araneae (34%) and Homoptera (31%). Sprout seeds of plants were founded in three food samples and small stones were also found in several samples (Table 1). It is interesting that a similar proportion were found with the groups Coleoptera (0.9-5.0%) and Gastropoda (0.8-5.1%) compared to above mentioned studies.

The average length of the prey items was 8.0 mm (Fig. 1) though it ranged from 1.9 mm (Aphidoidea, Psocoptera, Aranea) to 21.0 mm (larva of Geometridae). The most frequent prey size was 2-4 mm (Aphidinea, Araneae, Psocoptera) and 10-12 mm (Chironomidae, Brachycera). Other studies have been reported much lower values than this. For example, a value of 5.2 mm was recorded in Poland (Dyrcz 1979) and 6.6 mm in Switzerland (Dyrcz 1979). An overall diversity index was H' = 1.109. Food composition was found to be significantly different between the North and South shore ($\chi^2 = 75.69$, df = 14, $p<0.001$, Table 1), however, no statistical difference (t-test) was found in the size of food items between these two plots. Some of the deviations observed can be attributed to the affect of local conditions on particular dates. In addition, some variation due to habitat differences, previously described by Dyrcz (1979) and Bibby & Thomas (1985), was found also in our study plots. Our results show that the reed warbler is able to utilise food overall broad trophic niche with prey being taken from leaves of tress (e.g. larvae of Lepidoptera), the plant zone (e.g. *Tibellus maritimus, Bathypanthes nigrinus, Succinea putris, Ceapea hortensis*), the surface of the soil (e.g. *Linyphia clathrata*, Isopoda, Gastropoda), from bushes (*Philodromus rufus, Linyphia triangularis*) and

Table 1. Diet of reed warbler nestlings from different plots in the South-eastern part of the Czech Republic. (D - dominance, F -frequency). Significant differences between components are indicated with asterisk. *p<0.05; **p<0.01; ***p<0.001. N.S. - non significant.

Prey group	North shore			South shore			significance
	n (325)	D (%)	F (%)	n (333)	D (%)	F (%)	(z-test)
DIPTERA	260	80.0	100	185	55.6	97	***
Nematocera	175	53.9	61	126	37.8	51	***
Brachycera	79	24.3	84	53	16.0	87	**
Larvae	6	1.8	9	6	1.8	13	
HOMOPTERA	24	7.4	32	64	19.2	36	***
Aphidinea	17	5.2	21	50	15.0	28	***
Cicadinea	3	1.0	9	12	3.6	21	*
Psyllinea	4	1.2	4	2	0.6	3	N.S.
ARANEAE	15	4.6	28	26	7.8	39	*
HYMENOPTERA	6	1.8	14	14	4.2	15	*
PSOCOPTERA	2	0.6	2	11	3.3	10	**
HETEROPTERA	3	1.0	7	12	3.6	21	**
NEUROPTERA	-	-	-	12	3.6	18	
Imagines	-	-	-	8	2.4	10	
Larvae	-	-	-	4	1.2	8	
COLEOPTERA	7	2.2	16	1	0.3	3	*
Imagines	2	0.6	4	-	-	-	
Larvae	5	1.6	12	1	0.3	3	
LEPIDOPTERA	2	0.6	5	4	1.2	10	N.S.
Imagines	1	0.3	2	1	0.3	3	
Larvae	1	0.3	2	3	0.9	8	
GASTROPODA	4	1.2	7	-	-	-	
TRICHOPTERA	-	-	-	2	0.6	5	
OPILIONES	-	-	-	1	0.3	3	
ISOPODA	1	0.3	2	-	-	-	
DERMAPTERA	-	-	-	1	0.3	3	
ENSIFERA	1	0.3	2	-	-	-	

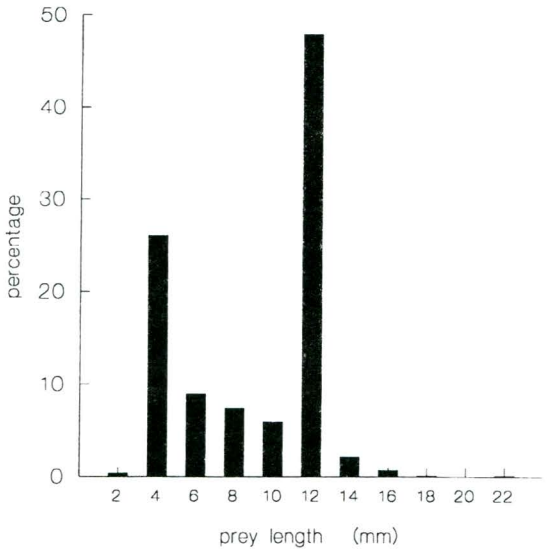

Fig. 1. Frequency distribution of body length for prey offered to reed warblers nestlings by their parents in the South-eastern part of the Czech Republic.

the reeds themselves (e.g. Aphidioidea). The food of nestlings may therefore be affected by factors that influence the accessibility of dietary elements, especially by the oscillation and fluctuation of prey populations. The food of nestlings is, therefore, a reflection of the food offered by the available habitat. This assumptions has been substantied on a number of occasions during, for example, the swarming of Formicidae. This indicates, that reed warblers are opportunist in their feeding habits, a phenomenon observe elesewhere by C a t c h p o l e (1973) and H e n r y (1977, 1978), meaning that it is able to take advantage of local, variable or short-lived sources of food, when abundant. This ability is further supported by the fact that feeding flights are relatively long, though less than 50 m from nests.

A c k n o w l e d g e m e n t s

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Authors' addresses:

Tomáš GRIM,

Department of Zoology and Ecology, Faculty of Sciences, Masaryk University, Kotlářská 2, 611 37 Brno, Czech Republic

Marcel HONZA,

Institute of Landscape Ecology, Academy of Sciences of the Czech Republic, Květná 8, 603 65 Brno, Czech Republic