

**FOOD NICHE OF *ATHENE NOCTUA* (SCOPOLI, 1769) AND
TYTO ALBA (SCOPOLI, 1769) (*AVES: STRIGIFORMES*)
CO-EXISTING IN ONE REGION OF THE UPPER TRACIAN
VALLEY (SOUTH BULGARIA)**

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Abstract: The method of pellet content analysis was used to study the two co-existing owls` species diets in a village region (Trankovo village, Upper Tracian Valley, South Bulgaria, UTM: MG08). More than 350 pellets (minimum 802 diet components) from *Athene noctua* and *Tyto alba* were gathered and analyzed after the autumn-winter periods of 1999 and 2003. The main prey, most similarity by food source using and diversity of both diets were studied. In the area investigated there was a high food niche-overlap level calculated (91 %) between the two synanthropic owl species.

Key words: diet, food niche, *Athene noctua*, *Tyto alba*, Bulgaria.

INTRODUCTION

The food spectrum of the species *Athene noctua* (Scopoli, 1769) and *Tyto alba* (Scopoli, 1769) are well studied in Europe. The diet of *Athene noctua* is more various, than this of *Tyto alba*. The first species mainly feeds on insects as *Coleoptera*, *Dermaptera* and *Orthoptera*, and mammals: *Microtus spp.*, *Mus spp.*, *Sylvaemus spp.*, but the second – mostly on mammals like *Microtus spp.* and *Crocidura spp.* (CRAMP, 1985).

These two synanthropic species differ by their ecological preferences, and they co-exist in many regions without any competition (FATTORINI, 1999; SARA, 1990).

There is not abundant information from Bulgaria on the food source relations between owl species. The food niche of *Tyto alba* was studied recently (MILCHEV, BOEV & GEORGIEV, 2004). Our aim was to study the food niche overlap and the similarities between the two synanthropic species when co-existing.

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MATERIAL AND METHODS

The method of pellet contents analysis was used to study the two co-existing owls` species diets.

Over than 100 pellets (minimum 195 food components registered) from *Athene noctua*, and over than 250 pellets (minimum 607 food components registered) from *Tyto alba* were gathered and analyzed after the autumn-winter periods of 1999 and 2003.

The material was gathered within buildings (agricultural and abandoned ones) in the region of Trankovo village, south-east of Stara Zagora Town (The Upper Tracian valley, Bulgaria): UTM-coordinates: MG08.

In the area open agricultural habitats dominated the landscape. There was a small river (which often dries up) passing through the village, and some pasture grasslands and bushy habitats out of it, occupied generally by *Paliurus spina-christi* Mill.

The pellets were softened into water to separate the prey items.

The food components were determined using keys by ПОПОВ, СЕДЕФЧЕВ (2003); MACDONALD, BARRET (1993); СОКОЛОВ et al. (1963).

Sampling adequacy was analyzed using LEHNER`s formula (LEHNER, 1979):

$$Q = 1 - N_1 / I,$$

rising from 0 to 1, where N_1 is the number of the food components occurring only once, and I is the total number of the food components.

Diversity of the diets was studied by calculating the SIMPSON`s diversity index S (BEGON, HARPER, TOWNSEND, 1986):

$$S = 1 / \sum p_i^2,$$

where p_i is the proportion of each component in the diet.

The MORISITA`s index modified by HORN (1966) was used to study the similarity in using a single diet component:

$$C = 2 \sum x_i y_i / (\sum x_i^2 + \sum y_i^2),$$

where x_i and y_i are the percentages of a particular food component in the diet of the two studied species.

The food niche overlap was calculated by PIANKA`s adaptation of MACARTHUR and LEVINS` formula (KREBS, 1989):

$$O_{jk} = \sum_n p_{ij} p_{ik} / \sqrt{\sum p_{ij}^2 \sum p_{ik}^2},$$

where j and k refer to the two species under comparison.

The index termoxerophilly was calculated by CONTOLI`s formula (CONTOLI, 1980; 1981):

$$TXI = N_{Crocidura} / N_{Soricidae},$$

where, the total number of *Crocidura spp.* divide by the total *Soricidae spp.* number in the *Tyto alba*'s diet.

RESULTS AND DISCUSSION

The results from our study are to be found in Table 1.

The Sampling adequacy had high values estimated: for *Athene noctua* it was 1,0, and for *Tyto alba* was 0,97.

There have been minimum of 8 different food components in the *Athene noctua* and 9 in *Tyto alba*'s diets registered.

The first species' main prey were: *Microtus spp.* (39%), *Mus spp.* (27,7%) and insects (25,7%) and for the second one we obtained: *Crocidura spp.* (39%), *Microtus spp.* (33,6%) and *Mus spp.* (22,1%).

The diet of *Athene noctua* in the region during winter period was about two times more various ($S = 6,3$) than this of *Tyto alba*'s one ($S = 3,15$). In spite of this fact, the food niche overlap was very high: $Ojk = 91$. The highest similarity was calculated in using the voles as a food resource (98,9%), followed by *Sylvaemus spp.* (98,2%) and *Mus spp.* (97, 5%).

They were very similar diets and main prey due to the lack of various habitats providing small mammals as: *Cricetinae spp.*, *Gliridae spp.*, *Clethrionomys spp.*, *Pitymys spp.*, *Sorex spp.*, *Chiroptera spp.*, and others commonly hunted (CRAMP, 1985; RUPRECHT, 1979; POPESCU, 1987; FATTORINI, 1999; OBUCH, 1998; LAIU, MURARIU, 1997; CAPIZZI, 1998; PETRESCU, 1994). The anthropogenic influence is expressed generally on aridization of the habitats, and they could not provide such a various prey (MORTON, MARTIN, 1979; LIMA et al., 2002), and it was evident after calculating the Termoxerophilly index ($TXI = 99,6\%$). The unfavorable winter period, when it is usual for the owl food spectrum to go poorer, explained the absence or small amounts of insects, reptiles and amphibians in both diets (СИМЕОНОВ, 1978; 1983; СИМЕОНОВ и кол., 1981; ROMANOWSKI, 1988; BON, RATTI and SARTOR, 2001; GOUTNER, ALIVIZATOS, 2003).

Tab.1. Results from the food niche study of co existing *Athene noctua* and *Tyto alba* in the region of Trankovo village in The Upper Tracian Valley (Southern Bulgaria). Legend: n-minimal number of prey items, %-percent of occurrence in the diet.

Табл.1. Резултати от изучаването на хранителните ниши на съвместно зимуващи *Athene noctua* и *Tyto alba* в района на с. Трънково в Горнотракийската низина (Южна България). Легенда: n-минимален брой хранителни компоненти, %-процент на срещаемост в храната.

food component хранителен компонент	<i>Athene noctua</i>		Morisita index, %	<i>Tyto alba</i>	
	n	%		n	%
<i>Coleoptera spp.</i>	38	19,5	0	0	0
<i>Orthoptera spp.</i>	8	4,1	0	0	0
<i>Dermaptera spp.</i>	4	2,1	0	0	0
<i>Passeriformes spp.</i>	3	1,5	38,50	2	0,3
<i>Crocidura spp.</i>	3	1,5	7,70	235	39
<i>Neomys anomalus</i> Cabrera 1907	0	0	0	1	0,2
<i>Suncus etruscus</i> Savi (1822)	0	0	0	4	0,7
<i>Sylvaemus spp.</i>	9	4,6	98,20	23	3,8
<i>Rattus spp.</i>	0	0	0	2	0,3
<i>Mus spp.</i>	54	27,7	97,50	134	22,1
<i>Microtus spp.</i>	76	39	98,90	204	33,6
<i>Mustela nivalis</i> Linnaeus 1766	0	0	0	1	0,2
Total	195	100		607	100
Sampling adequacy	1			0,97	
Simpson index	6,3			3,15	
Niche overlap	91%				

CONCLUSIONS

1. For the first time in Bulgaria food niche of co existing owls species has been studied.

2. In area with high anthropogenic pressure combined with unfavorable climatic conditions during autumn-winter period, there was a high niche overlap level calculated between *Athene noctua* and *Tyto alba*: $O_{jk} = 91\%$.

3. The diet of *Athene noctua* in the region during winter period was about two times more various ($S = 6,3$) than this one of *Tyto alba* ($S = 3,15$).

4. The main prey of the first species were *Microtus spp.* (39%), *Mus spp.* (27,7%) and insects (25,7%) and for the second one they were *Crocidura spp.* (39%), *Microtus spp.* (33,6%) and *Mus spp.* (22,1%).

5. The highest similarity was calculated in using the voles as a food resource (98,9%), followed by *Sylvaemus spp.* (98,2%) and *Mus spp.* (97, 5%).

6. The Termoxerophilly index for the study area calculated had high values: $TXI = 99,6\%$.

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**ХРАНИТЕЛНИ НИШИ ПРИ
ATHENE NOCTUA (SCOPOLI, 1769) И *TYTO ALBA* (SCOPOLI,
1769) (*AVES: STRIGIFORMES*), СЪВМЕСТНО
СЪЩЕСТВУВАЩИ В ЕДИН РАЙОН, РАЗПОЛОЖЕН В
ГОРНОТРАКИЙСКАТА НИЗИНА (ЮЖНА БЪЛГАРИЯ)**

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(резюме)

До настоящия момент в България информацията за хранителните ниши на сови не е изобилна. Ние си поставихме за цел да изследваме тези при два съвместно съществуващи синантропни вида: *Athene noctua* (Scopoli, 1769) и *Tyto alba* (Scopoli, 1769).

За изследване на хранителния спектър е използван методът на анализ съдържанието на погадки и хранителни остатъци. Изучени са минимум 802 хранителни компонента от над 350 погадки, събрани след есенно-зимния период през 1999 и 2003 година, от района на с. Трънково (Горнотракийска низина, Южна България, UTM: MG08).

Установено е, че при тези условия, хранителния пектър на *Athene noctua* е приблизително два пъти по-богат ($S = 6,3$) от този на *Tyto alba* ($S = 3,15$), а основни хранителни компоненти са съответно: *Microtus spp.* (39 %), *Mus spp.* (27,7 %) и *Insecta* (25,7%) за първия, и *Crocidura spp.* (39%), *Microtus spp.* (33,6%) и *Mus spp.* (22,1%) за втория вид.

Най-висока стойност на сходство при използване на даден хранителен ресурс за двата вида е отчетена за *Microtus spp.* (98,9%), следвани от *Sylvaemus spp.* (98,2%) и *Mus spp.* (97,5%).

Установена е висока стойност на припокриване на хранителните ниши ($Ojk = 91\%$).

Стойността на индекса за термоксерофилия за изследвания район е висока ($TXI = 99,6\%$).

