

THE STUDY OF THE TROPHIC SPECTRUM OF TWO POPULATION OF *RANA ARVALIS* NILLS 1842 FROM THE NORTH OF BIHOR COUNTY

BY

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In this study the authors aim was to present the trophic spectrum of two different populations of *Rana arvalis* from the north of Bihor county (Voivozi, Cîrtuiușeni: Valea lui Mihai area and the Ier river basin). We analysed the stomach contents of 214 moorland frogs from Cîrtuiușeni and 126 frogs from Voivozi captured monthly from April to October 2001. The feeding of the frogs reaches the maximum in the autumn months, when we registered the highest number of preys/individual. In forest habitats *Rana arvalis* feed on more food items, but in a non-forest habitat we found more preys/individual and a smaller number of empty stomachs. The most frequently consumed food item is represented in both situations by Coleoptera species. In the studied stomach contents we constantly found plant fragments. The mobile food items have almost the same weight and are consumed with the same frequency in both habitats, but the Diplopoda and Chilopoda items are more abundant and frequent in the forest habitats, and the Gastropoda and Isopoda items in the non-forest habitat.

Introduction

Rana arvalis is a species belonging to the postglacial silvic wave (Stugren, 1956) and it is living in the north of Europe. Through Romania it passes the southern limit of its areal, which is limited to the northern part of the country (Cogălniceanu, 2000). In Romania there are two subspecies: *Rana arvalis arvalis* found in Depresiunea Brașovului at Reci (Fejervary-Langh, 1943) and *Rana arvalis wolterstorffi* found in Câmpia de Vest (Fuhn, 1960). This species was mentioned for the first time in Romania by Mehely, 1891 in Transsylvania. Despite the fact that there are some former studies about the populations from Romania (Dely, 1964, Stugren & Popovici, 1960) the data about the trophic spectrum of these species refers to a few individuals (Fuhn, 1962) and in the Romanian literature there are no studies dedicated only to this subject (Cogălniceanu & Andrei, 1992, Andrei & Török, 1997). There are data about the trophic spectrum of the moorland frogs from Panonic Plain (Török & Csörgö, 1992). In our study we want to present the trophic spectrum of two populations of *Rana arvalis* from the north of Bihor county, one living in a marshy land without any forest vegetation and the other living in

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marshy land situated in an acacia forest. The aim of our study was to compare the trophic spectrum of the moorland frogs from these two habitats, starting from the fact that this species feed more intensely in forestless habitats (Loman, 1979).

Material and methods

In our study area the species *Rana arvalis* was mentioned for the first time by Poliș, 1977, but it lives also in the plain area from the south of Bihor county (Covaciu-Marcov et al, 2000). The studied habitats are at Curtuișeni and Voivozi localities which are part of the Șimian village, the area near Valea lui Mihai town, in the Ier Plain at approximately 150 m altitude (Zaha, 1997). The habitat from Curtuișeni is situated at 3 km from the Curtuișeni locality and it is represented by a series of marshy areas from the inside and at the limit of an acacia forest. Despite the fact that the forest was planted to fix the sandy soil from this area, in the neighbourhood there is a rest of a former oak forest. The marshes are permanent, they have considerable dimensions (hundreds of square meters) which are shrinking during the summer. The marshy lands have a characteristic vegetation of reeds and rushes. The habitats are close to one other, the area is very little influenced by humans because this zone has no economic importance, the soil is sandy and it is situated near the state border. The habitat from Voivozi is represented by a marsh which stretches on a few kilometers long and it is between some meters and ten meters wide. It is situated on the banks of a river, a tributary of the Ier. On its banks there are dense populations of reed surrounded by rushes and an abundant herbaceous vegetation. The habitat is situated in an open area and has no forests in its neighbourhood. The marsh from Voivozi is surrounded by agricultural lands on each side.

Our study was made during the warm season of the year 2001, the samples were taken monthly between April and October. The number of frogs studied by month and habitat is presented in Table nr. 1 and 2. We tried to capture a constant number of amphibians in each month, although they are more difficult to capture during the summer than in spring and autumn (Gelder & Oomen, 1970). We studied 214 frogs from Curtuișeni and 126 from Voivozi. The amphibians were captured by hand, from the presented terrestrial habitats because *Rana arvalis* is a terrestrial species excepting the period when it is laying down its spawn (Fuhn, 1969). The sampled stomach contents were preserved in a 4% formalin solution and stored in water-tight test tubes. The contents were analysed in the laboratory with a 40X magnifying stereomicroscope, and the preys were determined using the available literature in this field (Ionescu et al, 1971; Crișan & Mureșan, 1999; Crișan & Cupșa, 1999; Radu V. Gh., & Radu. V. V., 1967).

Results and discussions

During our study we noticed that not all the individuals of *Rana arvalis* had stomach contents. At Curtuișeni 8,87% from the analysed stomachs were empty and at Voivozi 3,96% from the moorland frogs did not eat (Table nr. 1 and 2). This kind of situations we can find also at other species of amphibians as *Rana temporaria*, from the

north of England, where 4% of the individuals didn't have any stomach contents (Houston, 1973).

Table nr. 1. The total number of analysed stomachs, the number and the weight of the stomachs without content from Curtuiuşeni

The period of the study (month)	IV	V	VI	VII	VIII	IX	X	Total
Nr. of analysed stomachs	30	34	30	30	28	31	31	214
Nr. of empty stomachs	11	3	2	2	0	0	1	19
% of empty stomachs	36,66	8,82	6,66	6,66	0	0	3,22	8,87

Table nr. 2. The total number of analysed stomachs, the number and the weight of the stomachs without content from Voivozi

The period of the study (month)	IV	V	VI	VII	VIII	IX	X	Total
Nr. of analysed stomachs	18	20	17	16	17	20	18	126
Nr. of empty stomachs	5	0	0	0	0	0	0	5
% of empty stomachs	27,77	0	0	0	0	0	0	3,96

The weight of the empty stomachs has an important seasonal variation, thus in both habitats the greatest number of empty stomachs was found in April (36,66% at Curtuiuşeni and 27,77% at Voivozi). This fact is due to the low temperatures registered during the sampling period from that month, temperatures which had a negative influence not only on the preys which were less accesible - we found only cold weather resistant prey species - but also the moorland frogs. Excepting April, at Voivozi we didn't found empty stomachs and at Curtuiuşeni the number of these is very low. In August and September al the stomachs had contents. The weight of the stomachs with no contents is directly related to the environmental factors, the growth in the number of the empty stomachs suggesting unfavourable environmental conditions. The lack of the empty stomachs indicates good feeding conditions; in August and September in both biotopes there are no empty stomachs. These months correspond to an intensive feeding period. The comparative study of the empty stomachs in both biotopes suggests that some particular aspects can influence this paramether, at Curtuiuşeni the weight of the empty stomachs is constantly higher than at Voivozi.

In the stomach contents we found plant fragments and animal preys.

The plant fragments are food items we found during the whole period of the study at both populations. We identified leaf fragments, branch fragments, seeds, capsules, generally terrestrial plant fragments from the areas where the amphibians were captured. The stomachs with plant fragments represent 31,7% from all the stomachs at Curtuiuşeni and 25,3% at Voivozi (Table nr. 3 and 4). Plant fragments were found in the stomach contents of the moorland frogs also by other authors (Török & Csörgö, 1992).

Table nr. 3 The number and the weight of the stomachs with plant fragments at Curtuișeni

Month	IV	V	VI	VII	VIII	IX	X	Total
Total nr. of stomachs	30	34	30	30	28	31	31	214
Nr. of stomachs with vegetal content	10	5	6	10	8	14	15	68
% of stomachs with vegetal content	33,3	14,7	20	33,3	33,3	45,1	48,3	31,7

Table nr. 4 The number and the weight of the stomachs with plant fragments at Voivozi

Month	IV	V	VI	VII	VIII	IX	X	Total
Total nr. of stomachs	18	20	17	16	17	20	18	126
Nr. of stomachs with vegetal content	4	1	3	3	4	5	12	32
% of stomachs with vegetal content	22,2	5	17,6	18,7	32,5	25	66,6	25,3

The stomachs with vegetal contents have a great seasonal variation, their greatest weight was registered in the autumn months, period during which we found the greatest number of preys consumed by the studied populations. The direct relationship between the vegetal content and the animal preys suggests that the plants were consumed accidentally being ingerated at the same time with the animal prey so that the more preys the frogs captured, the more plant fragments they ingested. At the same time, in the autumn months we found dried plant fragments belonging to the herbaceous vegetation. Neither of the stomach contents do not have exclusively plant items, so it is obvious that they are consumed accidentally, the amphibians are consuming as a rule mobile preys and only as an exception imobile ones (Zimka, 1966). The plant fragments were frequently found in the stomach contents of other amphibian species as *Rana ridibunda* (Vancea et al., 1960; Covaciu-Marcov et al., 2000) *Rana perezi* (Hodar et al., 1990) and *Rana temporaria* (Itamies, Koskela, 1970).

The weight of the stomach contents with vegetal items is almost the same at the two studied population of *Rana arvalis*, fact which indicates that the particularities of the habitats do not have a great influence on this paramether of the trophic spectrum. In both biotopes the vegetal content reaches a maximum in April and another one much higher in October, during the summer months the values are lower.

The animal preys are the most important category of contents because the adult amphibians are predators (Cogălniceanu, 2000). During our study we identified 18 prey items (grouped in 20 categories) at the population of *Rana arvalis* from Curtuișeni and 16 items at Voivozi (Table nr. 5).

Table nr. 5 The variation of the prey items depending on biotope and period (c=Curtuișeni, v=Voivozi)

Month	IV		V		VI		VII		VIII		IX		X		Total	
	c	v	c	v	c	v	c	v	c	v	c	v	c	v	c	v
<i>Habitat</i>																
<i>Oligochaeta</i>	-	-	-	✓	✓	✓	✓	-	-	-	✓	✓	-	-	3	3
<i>Lumbricida</i>																
<i>Gasteropoda</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	7	7
<i>Acarina</i>	-	-	✓	-	✓	-	-	-	-	-	-	-	-	-	2	-
<i>Opilionida</i>	-	-	-	-	-	✓	-	✓	-	-	-	✓	-	-	-	3
<i>Araneida</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	7	7
<i>Crustacea</i>	-	-	-	✓	-	✓	✓	✓	-	✓	✓	✓	-	-	2	5
<i>Amphipoda</i>																
<i>Crustacea</i>	-	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	5	7
<i>Isopoda</i>																
<i>Miriapoda</i>	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	6	5
<i>Chilopoda</i>																
<i>Miriapoda</i>	-	-	✓	✓	✓	-	-	-	✓	-	-	✓	✓	✓	4	3
<i>Euplopoda</i>																
<i>Odonata adults</i>	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	1	-
<i>Odonata larva</i>	-	-	✓	-	-	-	-	-	-	-	-	-	-	-	1	-
<i>Dermaptera</i>	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	1	-
<i>Orthoptera</i>	-	-	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	6	5
<i>Coleoptera</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	7	7
<i>Homoptera</i>	-	✓	✓	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	5	6
<i>Cicadina</i>																
<i>Heteroptera</i>	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	6	6
<i>Lepidoptera larva</i>	-	-	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	6	5
<i>Lepidoptera adults</i>	-	-	-	-	-	-	-	-	✓	-	-	-	✓	-	2	-
<i>Diptera</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	7	6
<i>Hymenoptera</i>	✓	-	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	7	5
<i>Reptilia</i>	-	-	-	-	-	-	-	-	✓	-	-	✓	-	-	1	1
<i>Lucertida</i>																
Total	5	7	13	12	13	14	13	12	15	11	13	16	14	10	20	16

The great number of identified prey items from Curtuișeni is due to the fact that in this habitat the forest offer a more diverse trophic base from the point of view of the food items that the habitat from Voivozi. Three prey items: Gastropoda, Araneida and Coleoptera are always present in the trophic spectrum of the both populations, during the whole period of the study. At Curtuișeni the Diptera and Hymenoptera are constantly present during the whole period of the study and at Voivozi the Isopoda are constant. Three prey items: Acarina, Odonata, Dermaptera were found only at Curtuișeni and also we found Lepidoptera adults only here. One prey item, the Opilionida was present only at Voivozi. At both investigated populations the smallest number of prey items were registered in April, because of the same reason which generated the empty stomachs in this month. The greatest number of prey items/month

was recorded at Curtuiuşeni in August, 15 prey items and at Voivozi in September, 16 prey items. At Curtuiuşeni 4 prey items appear accidentally in one month only, at Voivozi only one item – *Lacertida* – appeared in one month only during the whole period of the study. It is interesting that the *Lacertida* items appear in the food in both biotopes of the moorland frogs in the stomachs of which we certainly identified a juvenile of *Lacerta agilis*. The lizards are present in the food during August and September when the juvenils appear, and these are accesible from the point of view of the dimension to the bigger frogs. In favourable conditions the amphibians are feeding with large size preys and in the literature there are mentioned cases in which they attack reptiles. Fuhn 1956 mentioned that in captivity *Rana arvalis* captured juvenils of *Anguis fragilis*. Jarnefelt in 1915 mentioned that *Rana temporaria* attack juvenils of *Lacerta vivipara*. The Cicadina species are present constantly from July to October; before these months they are absent or very rare in the stomach contents. The variation of one prey in the food of the amphibians is due in the first place to the variation of the item itself (Houston, 1973). The Lepidoptera are consumed in both biotopes in the larvai stage which are easier to capture and they represent important preys because the high content of lipids (Brooks et al., 1996). We found adult Lepidoptera only at Curtuiuşeni.

From the 18 prey items identified at Curtuiuşeni, there was a number of 1060 preys at Voivozi too 814 (Table nr. 6 and 7).

Table nr. 6. The variation of the number of preys, the average and the maximum number of preys/individual at Curtuiuşeni

Month	IV	V	VI	VII	VIII	IX	X	Total
Nr. of individuals	30	34	30	30	28	31	31	214
Nr. of preys	28	133	117	115	122	260	285	1060
Average nr. of preys/ individual	0,93	3,91	3,9	3,83	4,35	8,38	9,19	4,95
maxim % of preys/ individual	4	8	9	9	10	26	19	26

Table nr. 7. The variation of the number of preys, the average and the maximum number of preys/individual at Voivozi

Month	IV	V	VI	VII	VIII	IX	X	Total
Nr. of individuals	18	20	17	16	17	20	18	126
Nr. of preys	25	111	149	86	91	235	117	814
Average nr. of preys/ individual	1,38	5,55	8,76	5,37	5,35	11,75	6,5	6,46
Maxim % of preys/ individual	5	10	18	9	13	26	13	26

The average number of preys/individual at Curtuiuşeni is 4,95 preys/individual and at Voivozi 6,46 preys/individual. Despite the greater diversity of the items at Curtuiuşeni, in a forest region, the number of preys/individual is greater at Voivozi in a

forestless marshy land. The seasonal evolution of the mean number of preys/individual is similar at the both populations from different habitats with the mention that at Voivozi, in a forestless area, the number of preys/individual is almost constantly greater than at Curtuișeni. So, at both populations, the smallest number was found in April, it increased in May and June and dropped a little in July. The average number of preys/individuals is the highest in autumn months (September and October). As an exception, in October the average number of preys/individual is smaller at Voivozi comparatively to Curtuișeni, in the first place because the samples from this site were collected in that month in a rainy day when *Rana arvalis* feeds less than in the sunny days which come after the rainy ones (Zimka, 1971). The fact that in April the average number of preys/individuals is extremely small is due to the low temperatures from that period, this parameter is related directly to the number of empty stomachs. In April we found the most numerous empty stomachs and the fewest number of preys/individual. The slightly decrease in the average number of preys/individual in the summer months (July) is related to the dryness in that period, which has a negative influence on the predators and the potential preys. The most favourable periods for feeding for *Rana arvalis* - when the greatest number of preys/individuals were registered - are the end of the spring, beginning of the summer (May) and the beginning of the autumn (September) when the environmental conditions are good for the predators and the preys. In September we also found the greatest number of preys consumed by a single individual of *Rana arvalis*, 26 prey/individual, in both biotopes.

An important parameter of our study was to establish the weight of each prey item depending on the period of the year and the habitat (Tables nr. 8 and 9).

Table nr. 8 The weight of the preys from the prey items at Curtuișeni

Month	IV	V	VI	VII	VIII	IX	X	Total
<i>Oligochaeta Lumbricida</i>	-	-	1,7	1,73	-	0,38	-	0,47
<i>Gasteropoda</i>	21,42	0,75	1,7	0,86	13,93	7,3	3,15	5,18
<i>Acarina</i>	-	0,75	1,7	-	-	-	-	0,28
<i>Araneida</i>	25	26,31	21,36	10,43	11,47	13,46	6,66	13,86
<i>Crustacea Amphipoda</i>	-	-	-	1,73	-	0,38	-	0,28
<i>Crustacea Isopoda</i>	-	-	1,7	2,6	3,27	0,38	1,4	1,32
<i>Miriapoda Chilopoda</i>	-	6,76	5,12	6,08	3,27	2,3	3,15	3,86
<i>Miriapoda Diplopoda</i>	-	0,75	3,41	-	0,81	-	-	0,56
<i>Odonata adults</i>	-	-	-	-	0,81	-	-	0,09
<i>Odonata larva</i>	-	0,75	-	-	-	-	-	0,09
<i>Dermaptera</i>	-	-	-	-	-	-	0,35	0,09
<i>Orthoptera</i>	-	0,75	4,27	5,21	5,73	5,38	2,1	3,67
<i>Coleoptera</i>	42,85	42,1	40,17	45,21	27,04	15,38	21,75	28,49
<i>Homoptera Cicadina</i>	-	6,76	-	8,69	15,57	47,3	48,07	28,11
<i>Heteroptera</i>	-	8,27	5,98	3,47	1,63	0,38	1,05	2,64
<i>Lepidoptera larva</i>	-	3	4,27	2,6	4,91	2,3	9,47	4,9
<i>Lepidoptera adults</i>	-	-	-	-	0,81	-	0,35	0,18
<i>Diptera</i>	7,14	0,75	5,12	3,47	7,37	2,69	1,05	3,01
<i>Hymenoptera</i>	3,57	1,5	3,41	7,82	2,45	2,3	1,4	2,83

<i>Reptilia Lacertida</i>	-	-	-	-	0,81	-	-	0,09
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Table nr. 9 The weight of the preys from the prey items at Voivozi

Month	IV	V	VI	VII	VIII	IX	X	Total
<i>Oligochaeta Lumbricida</i>	-	2,7	1,34	-	-	5,1	-	2,08
<i>Gasteropoda</i>	4	19,81	20,13	19,76	23,07	5,95	11,11	14,49
<i>Opiliona</i>	-	-	0,67	1,16	-	0,42	-	0,36
<i>Araneida</i>	44	33,33	4,69	16,27	5,49	7,65	5,98	12,16
<i>Crustacea Amphipoda</i>	-	0,9	1,34	3,48	1,09	0,85	-	1,1
<i>Crustacea Isopoda</i>	8	2,7	11,4	17,44	26,37	4,68	21,36	11,91
<i>Miriapoda Chilopoda</i>	-	4,5	2,68	3,48	1,09	0,42	-	1,71
<i>Miriapoda Diplopoda</i>	-	0,9	-	-	-	0,42	0,85	0,36
<i>Orthoptera</i>	-	-	6,04	4,65	8,79	4,25	5,12	4,54
<i>Coleoptera</i>	20	22,52	29,53	25,58	19,79	14,89	22,22	21,49
<i>Hemiptera Cicadina</i>	4	-	12,75	2,32	5,49	43,40	24,78	19,44
<i>Heteroptera</i>	4	2,7	1,34	1,16	2,19	0,42	0,85	1,35
<i>Lepidoptera larva</i>	-	2,7	2,01	-	1,09	7,65	5,98	3,93
<i>Diptera</i>	16	3,6	1,34	1,16	5,49	1,7	-	2,45
<i>Hymenoptera</i>	-	3,6	4,69	3,48	-	1,7	1,7	2,45
<i>Reptilia Lacertida</i>	-	-	-	-	-	0,42	-	0,12

At both investigated populations of *Rana arvalis* the greatest percent in the trophic spectrum is that of Coleoptera (21,49% from the total preys at Voivozi and 28,49% at Curtuiuşeni). The Coleoptera is an important prey item for the moorland frogs and, in the center of Finland, this group has also the greatest weight between the food items (Itamies, 1982). In both habitats the Coleoptera preys are represented by the same families (Carabida, Elaterida, Curculionida, Staphilinida, Scarăbeida, Silphida, Coccinelida, Crisomelida, Cantharida) but at Curtuiuşeni the Carabida are more important probably because they are more abundant in the forest. If we take "weight" as a reference, in both habitats, the second place is taken by the Cicadina species representing 19,48% at Voivozi and 28,11% at Curtuiuşeni. Unlike the Coleoptera which are constantly present in both habitats every month, with a great percentage, the Cicadina are absent or have insignificant values till August, but they have the greatest weight in both habitats in September and October. So although the Coleoptera and Cicadina have similar weights they do not have the same value for the studied *Rana arvalis* populations; the Coleoptera are constantly important food items and the Cicadina have significant trophic value only in the autumn months. The rest of the time they are missing or they are not important in the stomach contents. This fact is due to the variations of the Cicadina prey item. The Coleoptera and Cicadina have the greatest weights in both biotopes, but they have different values in the two biotopes which have different characteristics. At Curtuiuşeni on the third place with 13,86% are the Araneida, but at Voivozi on the third place are the Gasteropoda with 14,49%, the Araneida being only on the fourth place with 12,16%. At Curtuiuşeni the Gastropoda are on the fourth place with a value of 5,18% from the total number of preys. The greater value of Gastropoda at Voivozi is due mainly to the fact that there is a permanent stream in this

habitat and the vegetation around it represents a favourable environment for the Gastropoda, this area having a permanently greater humidity than Curtiuşeni area. Also, some of the species are aquatic Gastropoda. The greatest difference in the weight of the prey items registered between the two populations is for the Isopoda which at Curtiuşeni was found only in a proportion of 1,32% and at Voivozi the value for them is 11,91% from the total number of the preys. This is due to the same facts as in the case of Gastropoda, the differences between the two populations being a consequence of the different habitat conditions. The other prey items have lower weights and are relatively alike between the two populations and are auxiliary in the trophic base of the moorland frogs. As a rule the mobile prey items (flying species) have similar values in the food of the populations in both analysed habitats. We found different values for the less mobile (terrestrial) prey items, items which are more dependent on the environmental conditions of the two biotopes.

Another important parameter in the study of the trophic spectrum is the frequency of a certain prey item consumption by the amphibians. This parameter is important for the determination of the value of a certain prey item for the analysed populations, as a consequence of the fact that *Rana arvalis* can consume not only more prey items but also more individuals of a certain prey item. The frequency revealed by the ratio of the number of the stomachs which contain a certain prey item, and the total number of analysed stomachs (in percents) is presented in Table nr. 10.

Table nr. 10 The weight and frequency of the preys of the prey items found in the two studied habitats

	Nr. of preys		% of preys		Frequency (in %)	
	Curtiuşeni	Voivozi	Curtiuşeni	Voivozi	Curtiuşeni	Voivozi
<i>Oligochaeta</i>	5	17	0,47	2,08	1,86	11,9
<i>Lumbricida</i>						
<i>Gasteropoda</i>	55	118	5,18	14,49	18,69	46,82
<i>Acarina</i>	3	-	0,28	-	1,4	-
<i>Opilionida</i>	-	3	-	0,36	-	2,38
<i>Araneida</i>	147	99	13,86	12,16	46,26	45,23
<i>Crustacea Amphipoda</i>	3	9	0,28	1,1	0,93	5,55
<i>Crustacea Isopoda</i>	14	97	1,32	11,91	4,2	32,53
<i>Miriapoda Chilopoda</i>	41	14	3,86	1,71	19,15	9,52
<i>Miriapoda Diplopoda</i>	6	3	0,56	0,36	2,8	2,38
<i>Odonata adults</i>	1	-	0,09	-	0,46	-
<i>Odonata larva</i>	1	-	0,09	-	0,46	-
<i>Dermaptera</i>	1	-	0,09	-	0,46	-
<i>Orthoptera</i>	36	37	3,67	4,54	14,95	23,8
<i>Coleoptera</i>	302	175	28,49	21,49	63,55	73,8
<i>Homoptera Cicadina</i>	298	158	28,11	19,41	38,31	37,3
<i>Heteroptera</i>	28	11	2,64	1,35	11,68	7,93

<i>Lepidoptera larva</i>	52	32	4,9	3,93	16,35	19,04
<i>Lepidoptera adults</i>	2	-	0,18	-	0,93	-
<i>Diptera</i>	32	20	3,01	2,45	13,55	11,11
<i>Hymenoptera</i>	30	20	2,83	2,45	11,68	13,49
<i>Reptilia Lacertida</i>	1	1	0,09	0,12	0,46	0,79

The weight of a certain prey item does not correspond always to the frequency with which it is consumed by *Rana arvalis*. For example at Curtuiuşeni the Araneida has a weight of 13,86% from the total preys and the Cicadina 28,11%. But the first one was consumed by 99 frogs (46,26% from all of them) and the Cicadina by only 82 frogs (38,31%). This situation is due to the fact that the Araneida are accesible during the whole year in a great number, but the Cicadina are abundant only in the autumn months, so despite the fact that the Cicadina have a greater weight from the total number of preys, the Araneida are more important preys for the moorland frogs, because they are more accesible. We found the same situation at Voivozi, the variation of these food items is determinde by factors which depend on the prey items and not on the biotope conditions. The Araneida, Coleoptera, Cicadina, Lepidoptera, Diptera and Hymenoptera are consumed with almost the same frequency by both populations; the habitat does not have a great influence on these. But the Gastropoda and Isopoda are much more consumed at Voivozi and the Chilopoda at Curtuiuşeni. So, the influence of the biotope on the frequency of the consumption of the different preys is more important for the terrestrial prey items which are much easier to influence by the parameters of the habitats as a consequence of the reduced mobility, comparatively to the flying insects.

Both studied populations of *Rana arvalis* consumed especially terrestrial preys; the moorland frog is a terrestrial amphibian. At Curtuiuşeni we determined only 10 aquatic preys representing only 0,94% from the total preys; at Voivozi their weight was a little greater 2,08% because this area is passed through by a permanent stream.

Conclusions

1. During our study we identified 18 prey items at Curtuiuşeni and 16 at Voivozi; in the forest habitat the food offer is more various from the taxonomic point of view.

2. The feeding of the analised populations has two minimum points: one in April and another one in July. The minimum during the spring is a consequence of the low temperatures and that from July is a consequence of the dryness. The greatest number of preys/individual is registered during the autumn months (September and October).

3. In both populations we found plant fragments in the stomach contents.

4. In both populations the greatest weight of the prey items is of Coleoptera, Cicadina and Araneida or Gastropoda, the greatest frequency - the Coleoptera, Araneida or Gastropoda and after them the Cicadina. Although they have a greater weight the Cicadina are less important than the Araneida due to the fact that they appear only during autumn; but in this period they are abundant and are consumed in great number.

5. Even if the feeding of the moorland frogs is more intense in the forestless areas (Loman, 1979) (less empty stomachs/individuals at Voivozi) in the forest habitats the number of the consumed prey items are greater.

6. The differences between the trophic spectrum of the two studied biotopes are evident at the level of the terrestrial preys, the Gastropoda and Isopoda are more frequently consumed at Voivozi; the Chilopoda at Curtuiușeni and the mobile preys (flying insects) are consumed with approximately the same frequency by both populations.

7. The moorland frogs consume almost only terrestrial preys, an accountable fact for a terrestrial species.

8. *Rana arvalis* is a poliphagous zoophag, like other amphibian species (Ghira, 1997) and it is consuming all the mobile objects with which it come in contact and can swallow.

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