

The terrestrial isopod fauna of the Rinya region IV. Szilonics-puszta

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VADKERTI E. and FARKAS S.: *The terrestrial isopod fauna of the Rinya region IV. Szilonics-puszta.*

Abstract: Isopods of a wetland forest and the surrounding ruderal vegetation were sampled along a line transect by pitfall trapping. The captured 5 species were: *Porcellium collicola* Verh., *Trachelipus ratzeburgi* Brandt, *T. rathkei* Brandt, *Armadillidium vulgare* Latr. and *Hyloniscus riparius* Koch.. The number of individuals was much greater than expected. No difference was found between the spatial distribution of the species. *T. ratzeburgi* was the dominant species in both of the vegetations. The seasonal changes in surface activity, sex ratio and the number of gravid females were also examined.

Keywords: Isopod, Oniscidea, *Hyloniscus riparius*, *Porcellium collicola*, *Trachelipus ratzeburgi*, *T. rathkei*, *Armadillidium vulgare*, pitfall trapping, Danube-Drava National Park, wetland, spatial distribution, habitat preference, surface activity, sex ratio, population dynamics.

Introduction

The Danube-Drava National Park is located in South Transdanubia in Hungary and consists of many islandlike natural reserves. The systematic ecological research of the isopods living in the regions of DDNP began in 1996. One of the 61 sampling sites was located at Szilonicspuszta. The main questions of this study were: (1) which Isopoda species live here, (2) whether there is any habitat preference of the different Isopoda species, and how (3) the surface activity (4) the community structure (5) sex ratio and reproductive characteristics of their populations change in time.

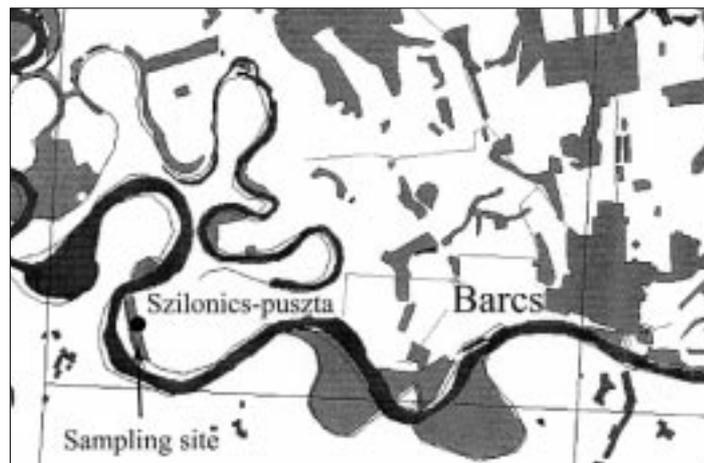


Fig. 1. The location of the sampling site

Material and methods

Szilonicpuszta is located 8 km west of Barcs (Fig. 1). The average temperature of the examined area in July is 21-22 °C and in the vegetation period (between 1st of April and 30th of September) is 17-18 °C. The annual precipitation is 700 mm.

The studied area consists of two habitat types: a wetland forest and an inundation ruderal vegetation which was a dense *Solidago canadensis* association. Five pitfall traps were placed in each of them. All of them were set in a 45-meter line transect. The distance between the traps was 5 meters. The transect started inside the forest and perpendicularly crossed the edge, ending in the ruderal vegetation. The leaf litter in the habitats was sparse.

The material was collected between 7th June 1996 and 15th November 1996. In spring the examined area was so wet that the experiment could not be begun until 1st May.

The data were standardized to analyse seasonal changes in surface activity by the equation: $N/d \cdot t_w$, where N = number of individuals in one sample, d = number of days between two checkings, and t_w = number of working traps. The sex ratio of the species was determined. Males were recognized by the presence of elongate pleopods on the ventral surface of the pleon. Individuals with marsupia were regarded as gravid females irrespective of whether the marsupium was full or empty.

The habitat preference was tested by multivariable statistics (TÓTHMÉRÉSZ 1996).

Results and discussion

(1) The 10 traps caught 5 species: *Porcellium collicola* Verh., *Trachelipus ratzeburgi* Brandt, *T. rathkei* Brandt and *Armadillidium vulgare* Latr., *Hyloniscus riparius* Koch (Table 1). Between 1996 and 1998 among others 8 wetland forests and 3 inundation ruderal vegetation were studied (FARKAS 1999). In all of these two kinds of habitats only these 5 species were collected so this result was to be expected. In other habitats the number of species were between 1 and 11.

Table 1. Number of captured male, gravid and non-gravid female individuals

	Porcellium collicola			Trachelipus ratzeburgi			Trachelipus rathkei			Armadillidium vulgare		
	males	ngravid	gravid	males	ngravid	gravid	males	ngravid	gravid	males	ngravid	gravid
06. 07.	27	76	26	461	666	554	243	198	143	695	1065	258
06. 21.	23	37	74	207	162	80	86	66	127	136	220	154
07. 06.	67	25	227	270	285	653	121	69	247	162	574	225
07. 31.	30	24	425	381	176	878	217	77	302	164	651	180
08. 19.	10	30	190	234	458	202	166	222	83	84	342	77
09. 10.	71	212	212	434	880	591	157	430	98	96	398	72
09. 27.	43	119	81	83	170	83	39	139	19	15	40	0
10. 25.	20	182	0	412	642	61	306	370	0	8	23	0
11. 15.	2	40	0	90	151	5	39	128	0	0	2	0

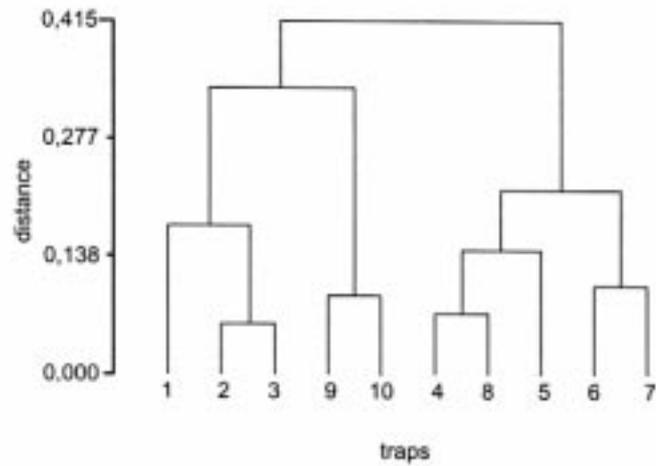


Fig. 2. The similarity dendrogram of the 10 traps by the isopod assemblages. Traps situated in wetland forest: 1 - 5; traps situated in inundation ruderal vegetation: 6 - 10.

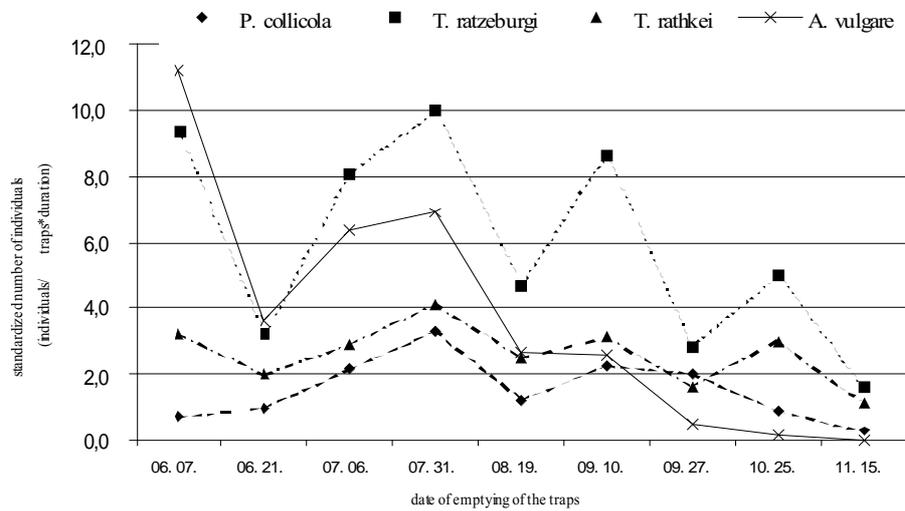


Fig. 3. Seasonal changes in surface activity of the species

(2) By the results of the cluster analysis of the isopod assemblages caught by the traps there is no habitat preference; the occurrence of the species does not reflect the difference between the two associations (Fig. 2). It is not surprising because *H. riparius* occurs everywhere independently from the type of association where there are moist microhabitats (GRUNER 1966). The other four species occur in all of the habitats in this region (FARKAS 1999).

(3) The total of 21,664 individuals of the 5 species were collected. Comparing these results to other similar long term experiments the number of individuals were 5 to 20 times more. The low number of *Hyloniscus riparius* (less than 1%) did not enable a reliable analysis so they were omitted from the statistics. The number of individuals was the highest at Szilonicpuszta among the habitats examined in the regions of DDNP. The surface activity of the four species had three peaks (Fig. 3). It may be concluded that the surface activity was the highest at the beginning of the summer. After a decrease at the end of June the activity showed an increasing tendency again. The decrease in the number of trapped animals on 19th August was probably due to a sampling error because the activity of the species was the highest in other sampled areas in this period (FARKAS, 1998a, 1998b).

(4) The temporal pattern of the composition of isopod assemblages did not change during the sampled period (Fig. 4) apart from *A. vulgare* whose participation decreased continuously. *T. ratzeburgi* was the dominant species in both vegetations; its participation did not drop below 30 %.

(5) The seasonal changes in sex ratio of the species (Fig. 5, 6, 7, 8) were different. The amount of gravid females of three species (*T. rathkei*, *T. ratzeburgi*, *P. collicola*) showed a similar tendency. The number of gravid females increased rapidly in June, peaked in July and decreased gradually from August. *A. vulgare* showed a different pattern: it peaked in June with a value at 30 %.

MCQUEEN (1976) reported that temperature is the major factor regulating growth, mortality and reproductive timing of *Trachelipus rathkei*. He found that 83% of mated adults produced one brood, and 42% a second, with some indication that the reproductive rate might be temperature-dependent. High temperature affects the reproductive pattern of isopods (HORNUNG and WARBURG 1993). The mean duration of gravidity were 51.4, 30.7, and 17.6 days at temperatures of 15.6, 21.0 and 26.7 ° C (SNIDER and SHADY 1980). They found that the most favorable temperature was 21 ° C, for both breeding and non-breeding females. The number of consecutive broods produced was dependent on initial female weight, the smaller females tending to breed only once (it was also influenced by temperature, since the highest temperature increased the incidence of second and third broods. From the end of May to middle of August 60-93 percent of the females were gravid. In our study the proportion of gravid *T. rathkei* females was 30-60 % in June and July, and 10-20 % during August and September. The gravid *T. ratzeburgi* females had a higher peak in July (60 %) and a smaller one in September (20-30 %). The number of nongravid females exceeded the gravids of both species from August. *Porcellium collicola* has one big, longterm breeding period. The amount of gravid females ranged between 40-90 percent. There were no available data on the population biology of *T. ratzeburgi* and *P. collicola* to compare these results.

For *Armadillidium vulgare* growth was more sensitive to changes in food quality than to temperature (HELDEN and HASSALL 1998). At low food quality 30-50 % of the females were gravid while at high food quality this amount was 70-90 %. There is a strong selection pressure for juveniles to respond strongly to temperature with respect to growth rates. In the spring and early summer, when they are larger, food availability is more limiting. At Szilonicpuszta the proportion of gravid females was low, 10-30 %.

DANGERFIELD and TELFORD (1994) studied the sex ratio of 5 isopod species. The per-

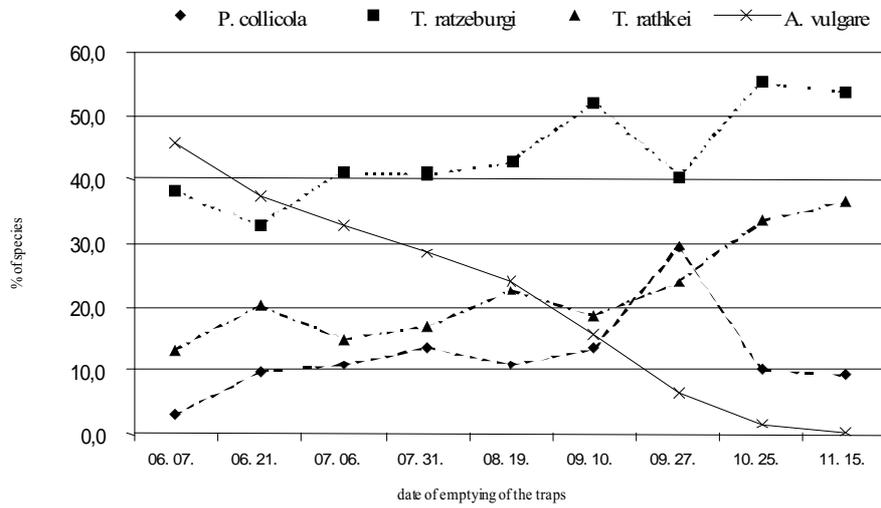


Fig. 4. Temporal changes in the composition of isopod assemblage

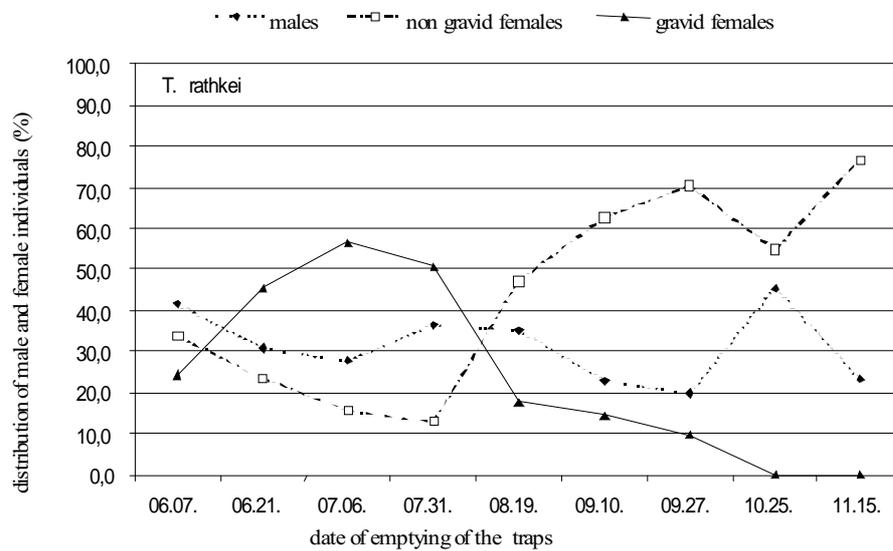


Fig. 5. Seasonal changes in the amount of male, gravid and non-gravid female individuals of *T. rathkei*

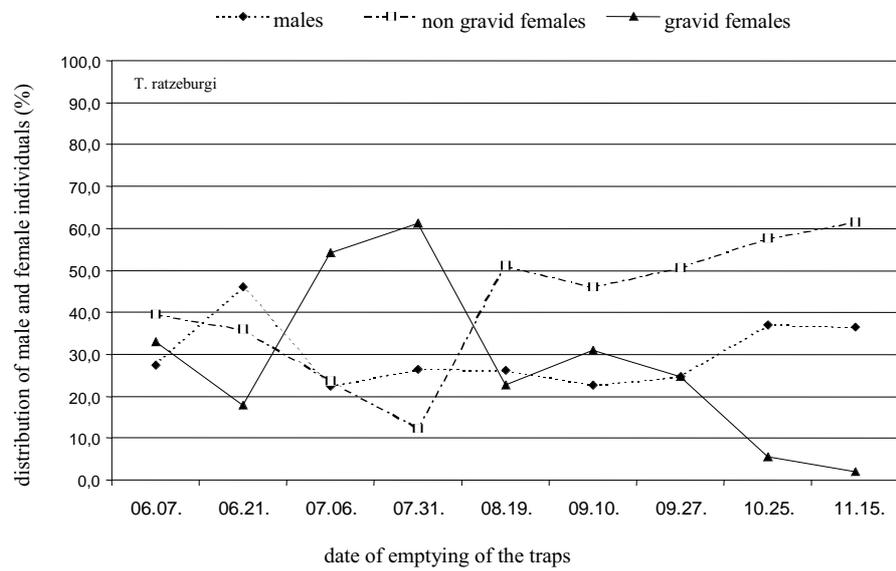


Fig. 6. Seasonal changes in the amount of male, gravid and non-gravid female individuals of *T. ratzeburgi*

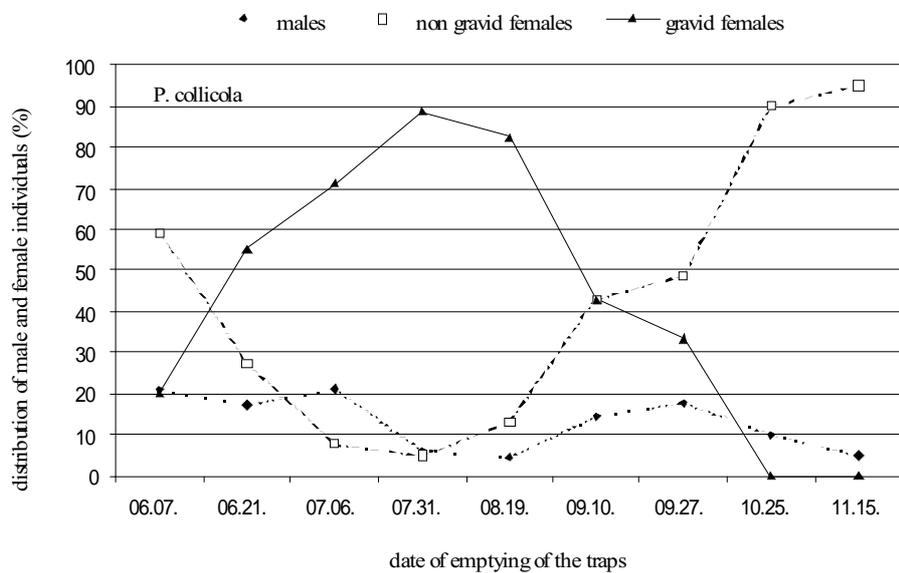


Fig. 7. Seasonal changes in the amount of male, gravid and non-gravid female individuals of *P. collicola*

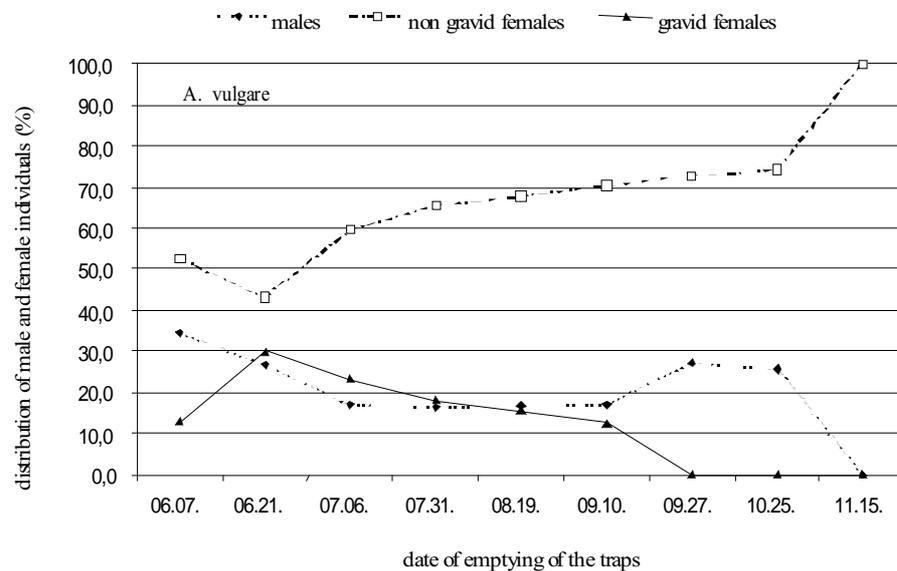


Fig. 8. Seasonal changes in the amount of male, gravid and non-gravid female individuals of *A. vulgare*

centage of the males ranged from 15 to 45. DANGERFIELD and HASSALL (1994) found the amount of male individuals of *A. vulgare* between 17-80 %. At Szilonicpuszta the participation of males for every species ranged from 10 to 50 %.

Comparing our results to other findings it can be concluded that probably the relatively high average temperature during the vegetation period and the appropriate humidity resulted in the outstandingly high number of individuals. In this ecological environment, under favorable temperature conditions plenty of juveniles can grow up. As we mentioned, in the habitats there was no observable leaf litter, so the reason the low proportion of gravid females (as had been expected) must be the lack of suitable food.

Acknowledgments

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1995 és 1998 között a Dráva-ártér 71 élőhelyén végeztünk kvalitatív-kvantitatív mintavételezést a terület szárazföldi ászkarák (Isopoda: Oniscidea) faunájának vizsgálatára céljából. A mintahelyek egyikét Szilonics-pusztán jelöltük ki. Két, különböző vegetációval borított foltban (ártéri nyáros és aranyvesszős ártéri gyom-vegetáció) összesen 10 talajcsapdát helyeztünk el line-transect elrendezésben. A folyamatosan működtetett csapdák 1996 júniusától novemberig összesen 21664 ászkarákot gyűjtöttek, melyek a következő 5 fajhoz tartoztak: *Porcellium collicola* Verh., *Trachelipus ratzeburgi* Brandt, *T. rathkei* Brandt, *Armadillidium vulgare* Latr. és *Hyloniscus riparius* Koch.. A két folt Isopoda együtteseinek összetételében nem találtunk különbséget. Mindkét foltban a *T. ratzeburgi* volt a domináns faj. A dolgozat további adatokat tartalmaz a gyűjtött fajok felszíni aktivitására és szaporodási jellemzőire vonatkozóan is.

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