

OCCURRENCE AND SEASONAL ACTIVITY OF EUROPEAN TICKS *IXODES RICINUS* (LINNAEUS, 1758) IN THE FOREST AREAS OF OLSZTYN

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ABSTRACT. A total of 667 ticks (82% nymphs, 10.5% females and 7.5% males) were caught at 7 selected sites within the Las Miejski in Olsztyn. The average population of ticks was 18.6 individuals/100 m². Two peaks of tick activity were recorded: the spring peak in May and the autumn peak in August.

Key words: *Ixodes ricinus*, nymphs, seasonal activity.

INTRODUCTION

The common tick *Ixodes ricinus* is the most common tick in Poland. These ticks are vectors of numerous pathogenic viruses, bacteria and protozoa (Prokopowicz 1995, Siński 1999). They are mainly found in deciduous and mixed forests, but they may inhabit coniferous forests with properly humid and ground litter (Grey 1998). Ticks have been found in forest areas situated within the boundaries of big cities, such as Warsaw (Siński and Rijpkema 1997), Gdańsk, Gdynia and Sopot (Wegner et al. 1997a), Wrocław (Pacoń 1998), Poznań (Nowosad et al. 1999), Szczecin (Skotarczak et al. 1999, Skotarczak and Wodecka 2000) and in areas changed by human activity (Siuda et al. 1991). Monitoring of the *I. ricinus* in the areas used by the public for recreation and leisure makes it possible to assess the risk of infection with the diseases they transmit.

MATERIALS AND METHODS

The research was conducted in the Las Miejski, which the inhabitants of Olsztyn use for recreation and leisure. Seven sites were selected, each of the area of about 500 m². They were selected by taking into account the variety of biotopes of particular sites and the distance from walking paths and recreational glades.

Ixodes ricinus ticks were sampled by flagging from the vegetation every 10-14 days from April to September 2000. During each catching session, the temperature and relative humidity of air was measured with an thermohigrometer, ca 1 m above the duff.

The seasonal activity of ticks was determined by calculating an average number of ticks caught by one person for one hour at a particular site in each month. For each site, the density of the tick population was calculated (number of ticks for 100 m²) and the ratio of nymphs to mature individuals was calculated (N:I).

RESULTS AND DISCUSSION

A total of 668 *I. ricinus* ticks were caught; 82% of them were nymphs (584 specimens, 10.5% females (70 spec.), and 7.5% males (50 spec.). No larvae were collected at any site (Table 1). Similar to the research conducted by Wegner et al. (1997b), in the area occupied earlier by provinces of Olsztyn, Białystok, and Gdańsk, the nymphs accounted for the highest percentage (72.2%) of all the ticks collected; for both sexes the proportion was 14.1% females and 13.7% males. A similar distribution of developmental stages was found by Skotarczak and Wodecka. (2000) in the recreation area in Szczecin (49% nymphs, 13.9% females and 11.3 % males).

Table 1. The quantitative and percentage occurrence of developmental stages of *I. ricinus* in the Las Miejski of Olsztyn

Site No.	Developmental stages [n/%]			Total number of ticks [n/%]	N:I*	Abundance [number of ticks /100m ²]
	nymphs	females	males			
I	32/72.7	9/20.5	3/6.8	44/6.6	2.7	116
II	135/88.8	7/4.6	10/6.6	152/22.8	7.9	30.4
III	91/81.3	13/11.6	8/7.1	112/16.8	4.3	17.9
IV	69/83.1	8/9.6	6/7.2	83/12.4	4.9	20.8
V	142/80.2	20/11.3	15/8.5	177/26.5	4.1	55.3
VI	58/87.9	5/7.6	3/4.5	66/9.9	7.3	15.0
VII	21/61.8	8/23.5	5/14.7	34/5.1	1.6	5.9
Total	548/82	70/10.5	50/7.5	668/100.0	4.6	18.6

* the nymphs-to-adults (imago) proportion

For all collected material, the nymphs to imago ratio (N:I) was 4.6 (Table 1). This result is comparable to that obtained by Wegner et al. (1997a) in the forest area of Gdańsk, Gdynia, and Sopot. In the municipal forests of Poznań, this index was 1.5 times higher (6.3), whereas, the average density of ticks population was 20.1 spec./100 m² (Nowosad et al.1999). In this study, the average tick population density was 18.6 spec./100 m². At particular sites it was not uniform and ranged from 5.9 spec./100 m² to 55.3 spec./100 m² (Table 1).

The average seasonal activity of *I. ricinus* ticks for the tested sites was bimodal. The spring peak was observed in May, when the average air humidity was 34% and the temperature was 17°C. The autumn peak was less distinct and occurred in August, with an average air humidity of 57% and a temperature of 24°C (Table 2). Wegner et al. (1997b) observed the peak of spring activity in May in the provinces of Gdańsk and Białystok, whereas for the province of Olsztyn the peak was observed in June. The autumn peak was observed in August in the provinces of Olsztyn and Gdańsk, and in September in the province of Białystok. Kolpy (1961, 1962a, b) found the spring peak of activity in Redykajny (near Olsztyn) to occur in May, and the autumn peak was in September.

Table 2. Average seasonal activity, temperature and air humidity in individual months (2000) of collection of *I. ricinus* in the Las Miejski of Olsztyn.

Month	Seasonal activity [number of ticks/1 person/ 1 hour/1 site]	Average temperature [°C]	Average air humidity [%]
April	6.2	10.4	59
May	21.6	17.0	34
June	14.6	21.7	50
July	9.4	18.7	77
August	13.1	24.0	57
September	6.6	14.8	65

No distinct relationship was found in this study between the tick activity and temperature, air humidity and composition of the vegetation. A restricting factor for tick occurrence are those places which are not favourable to potential hosts of those parasites, which was observed at site VII (Table 1). This site borders a forest path leading to a military rifle range.

REFERENCES

- Grey J.S. 1998. The ecology of ticks transmitting Lyme borreliosis. *Experimental and Applied Acarology* 22: 249-258.
- Kolpy I. 1961. Obserwacje nad rozprzestrzenianiem i aktywnością *Ixodes ricinus* L. na terenie Pojezierza Warmińsko-Mazurskiego. *Wiadomości Parazytologiczne* 7: 915-918.
- Kolpy I. 1962a. Badania nad ekologią kleszcza *Ixodes ricinus* L. na terenie województwa olsztyńskiego. Część I. Rozprzestrzenianie *Ixodes ricinus* L. w badanych biotopach województwa olsztyńskiego. *Zeszyty Naukowe WSR w Olsztynie* 15: 172-188.
- Kolpy I. 1962b. Badania nad ekologią kleszcza *Ixodes ricinus* L. na terenie województwa olsztyńskiego. Część II. Aktywność sezonowa kleszcza *Ixodes ricinus* L. na terenie województwa olsztyńskiego. *Zeszyty Naukowe WSR w Olsztynie* 16: 172-188.
- Nowosad A., Jenek J., Głazaczow A., Wal M. 1999. Kleszcze pospolite *Ixodes ricinus* (Linnaeus, 1758) z wybranych lasów komunalnych Poznania oraz ich zakażenie krętkami *Borrelia burgdorferi* sensu lato. *Przegląd Epidemiologiczny* 53: 299-308.

- Pacoń I. 1998. Distribution of ticks *Ixodes ricinus* on the recreation areas of Wrocław and after the flood in July 1997. *Wiadomości Parazytologiczne* 44: 386.
- Prokopowicz D. 1995. Choroby przenoszone przez kleszcze. Wydawnictwo Fundacji Buchnera, Warszawa.
- Siński E., Rijpkema S.G.T. 1997. Występowanie zakażeń *Borrelia burgdorferi* s.l. u kleszczy *Ixodes ricinus* w miejskim i podmiejskim biotopie leśnym. *Przegląd Epidemiologiczny* 51: 431-435.
- Siński E. 1999. Enzootyczne źródła nowych infekcji przenoszonych przez kleszcze *Ixodes ricinus*. *Wiadomości Parazytologiczne* 45: 135-142.
- Siuda K., Buczek A., Solarz K., Deryło A., Sadowski T., Kwiatkowski S., Horak B., Procyk A. 1991. Wstępne badania nad występowaniem kleszczy *Ixodes ricinus* (Acari: Ixodida: Ixodidae) na obszarach Jury Krakowsko-Częstochowskiej w różnym stopniu zmienionych antropopresją. *Wiadomości Parazytologiczne* 37: 17-20.
- Skotarczak B., Wodecka B. 2000. Występowanie *Ixodes ricinus* na wybranych terenach rekreacyjnych województwa szczecińskiego. Cz. II. *Wiadomości Parazytologiczne* 46: 265-272.
- Skotarczak B., Soroka M., Wodecka B. 1999. Występowanie *Ixodes ricinus* na wybranych terenach rekreacyjnych województwa szczecińskiego. Cz. I. *Wiadomości Parazytologiczne* 45: 507-517.
- Wegner Z., Racewicz M., Kubica-Biernat B., Kruminis-Łozowska W., Stańczak J. 1997a. Występowanie kleszczy *Ixodes ricinus* (Acari, Ixodidae) na zalesionych terenach Trójmiasta i ich zakażenie krętkami *Borrelia burgdorferi*. *Przegląd Epidemiologiczny* 51: 11-20.
- Wegner Z., Racewicz M., Kubica-Biernat B., Kruminis-Łozowska W., Stańczak J. 1997b. Występowanie krętków *Borrelia burgdorferi* sensu lato w kleszczach *Ixodes ricinus* na terenach północno-wschodniej polski. *Problemy Higieny* 54: 127-131.

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