

## Occurrence of *Pardosa* (Araneae, Lycosidae) species in winter wheat and in the field margin

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### ABSTRACT

Spiders, predatory carabids and staphylinids were collected by pitfall traps in Kartal (Northern Hungary) in winter wheat fields and in the field margins from late April 1992 until harvest (early July) and from early November 1992 until early July 1993.

More than 40 % of the spiders (4,73 individuals) belonged to 8 species of the genus *Pardosa*. Dominant species of the genus *Pardosa* were *P. agrestis* (Westring) and *P. prativaga* (C. L. Koch), 29 % and 4.7 % respectively.

Our presentation analyses the spatial distribution of 8 *Pardosa* species and seasonal activity of *P. agrestis*.

### INTRODUCTION

Individuals of the genus *Pardosa* can be found in high numbers among epigeic predatory arthropods in most Central European agroecosystems (Nyffeler 1982; Gajdoš 1992; Steinberger & Kromp 1993). Their potential role in pest control and the lack of information about species composition of spiders in Hungarian cereal fields encouraged us to study their occurrence in winter wheat.

### MATERIAL AND METHODS

The study area was located in northern Hungary about 40 km East of Budapest in the vicinity of the village Kartal. Two winter wheat fields (K1 and K2) were surveyed by pitfall traps in consecutive years.

#### K1:

The size of the field was 131 hectares. The width of the grassy-weedy margin was 2-3 m. Fifteen pitfall traps (diameter 95 mm, height 90 mm, containing 2 % formaline solution and a drop of detergent, emptied weekly) were operated from late April until early July (harvest) 1992 in 3 sampling sites as follows: 5 traps were placed in the margin (5 m apart from each other), 5-5 other traps in the field 30 m and 250 m from the margin. (See also Kiss *et al.* 1994.)

**K2:**

The size of the field was 250 hectares. The width of the grassy-weedy margin was 2-3 m. Twenty pitfall traps were operated from early November 1992 until early July (harvest) 1993 in 4 sampling sites as follows: 5 traps were placed in the margin (5 m apart from each other), 5-5-5 other traps in the field 20 m, 50 m and 250 m from the margin. The traps were emptied weekly, except winter when monthly.

All traps were placed at least 250 m from the other margins.

All adult spiders were identified to species level and stored in 70 % ethanol.

For identification the following literature was used: Heimer & Nentwig (1991); Locket & Millidge (1951); Roberts (1993); Loksa (1969, 1972); Töpfer-Hofmann & v. Helversen (1990).

Shannon-Weaver and Simpson-Yule diversity indexes (Southwood 1978) were used for characterising species composition of different sampling sites.

Tab. 1. Number of *Pardosa* individuals in different stages of development caught by pitfall traps in two winter wheat fields and in the field margins (Kartal, 24.IV.-04.VII.1992 (K1) and 02.XI.1992-07.VII.1993 (K2).

	K1	K2
adult males	927	483
adult females	241	75
subadult males	40	18
subadult females	31	14
juveniles	105	51
$\Sigma$ <i>Pardosa</i>	1344	641

Tab. 2. Number of adult *Pardosa* individuals in different sampling sites caught by pitfall traps in a winter wheat field and in the field margin (Kartal, 24.IV.-04.VII.1992).

K1	Margin	30 m	250 m	Total
<i>P. agrestis</i> (Westring)	315	321	313	949
<i>P. prativaga</i> (L. Koch)	175	16	11	202
<i>P. palustris</i> (Linné)	4		2	6
<i>P. alacris</i> (C. L. Koch)	1	3		4
<i>P. hortensis</i> (Thorell)		4		4
<i>P. bifasciata</i> (C. L. Koch)		1	1	2
<i>P. paludicola</i> (Clerck)		1		1
<b>Total</b>	<b>495</b>	<b>346</b>	<b>327</b>	<b>1168</b>
H (Shannon-Weaver index)	0,71	0,33	0,2	(0,56)
1-C (Simpson-Yule index)	0,47	0,14	0,09	(0,31)

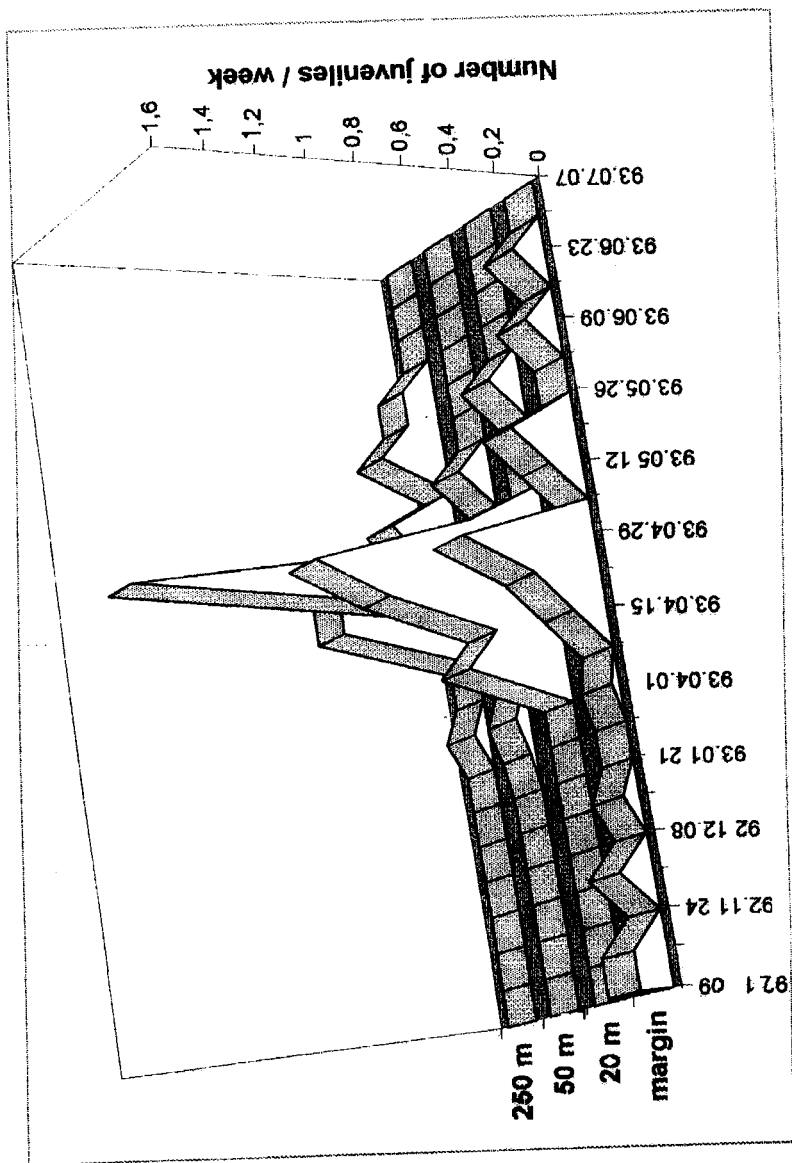


Fig. 1. Activity of juvenile *Pardosa* individuals in a winter wheat field, in different distances from the field margin (Kartal, pitfall traps, 02.XI.1992–07.VII.1993).

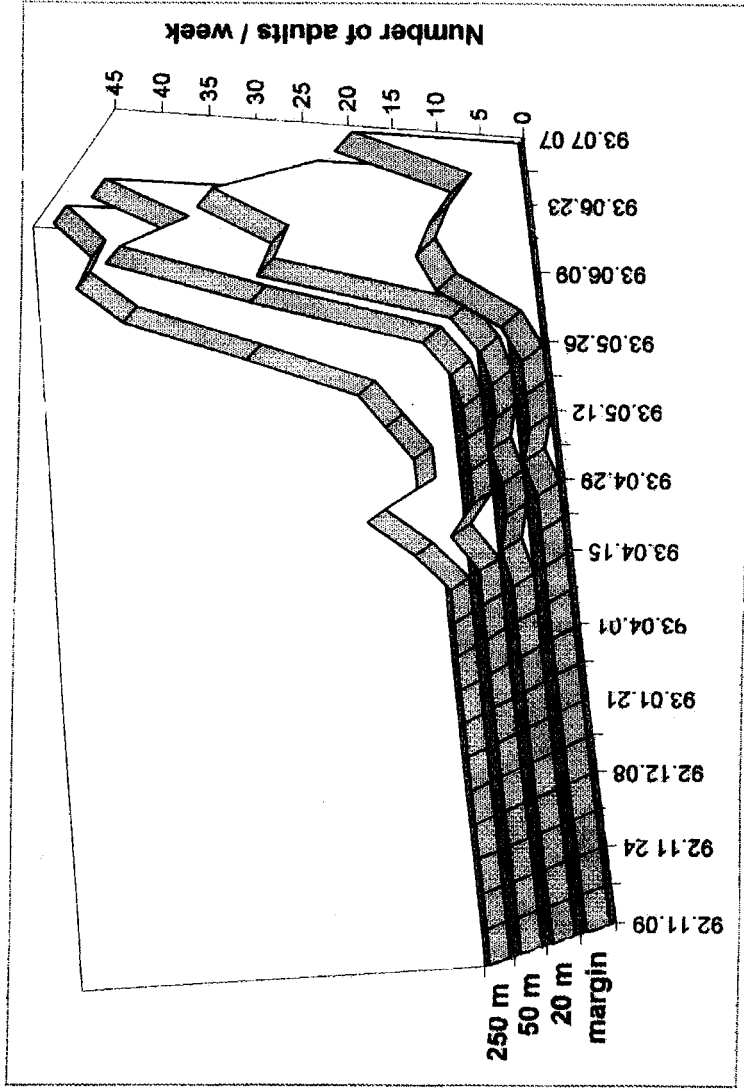


Fig. 2. Activity of adult *Pardosa agrestis* (Westring) individuals in a winter wheat field, in different distances from the field margin (Kartal, pitfall traps, 02.XI.1992–07.VII.1993).

Tab. 3. Number of adult *Pardosa* individuals in different sampling sites caught by pitfall traps in a winter wheat field and in the field margin (Kartal, -02.XI.1992–07.VII.1993)

K2	Margin	20 m	50 m	250 m	Total
<i>P. agrestis</i> (Westring)	54	109	144	214	521
<i>P. prativaga</i> (L. Koch)	13	2	1	2	18
<i>P. bifasciata</i> (C. L. Koch)	9		2	2	13
<i>P. palustris</i> (Linné)		3		1	4
<i>P. pullata</i> (Clerck)		2			2
<b>Total</b>	<b>76</b>	<b>116</b>	<b>147</b>	<b>219</b>	<b>558</b>
H (Shannon -Weaver index)	0,8	0,29	0,11	0,13	(0,32)
1-C (Simpson -Yule index)	0,47	0,12	0,05	0,05	(0,13)

## RESULTS

A total of 4,738 (2,835 in K1 and 1,903 in K2) spiders were caught during the two year study; 41.9 % of the total number of individuals belonged to genus *Pardosa* (with 8 species), most of which were adult males (Tabl. 1).

Dominant species of the genus were *Pardosa agrestis* (Westring), followed by *Pardosa prativaga* (C. L. Koch) in both fields. Other species were much less frequent. *Pardosa agrestis* occurred in high numbers in every sampling site, while *P. prativaga* was abundant only in the margins (Tab. 2-3.).

The diversity indexes in both fields decreased from the margins to the middle of the fields.

In K1, the sampling started too late (24 April) and did not cover a long enough period of time to provide information about seasonal activity of spiders. In K2, we studied the activity of spiders throughout nearly the whole winter wheat growing season, including winter. In autumn the margin traps caught a few juveniles of *Pardosa* while the field traps caught no *Pardosa* at all. In spring the first individuals (juveniles) appeared in all sampling sites in early April (Fig. 1). The traps located 250 m in the field caught adults regularly from the end of April, while in the other distances and in the margin there were no regular occurrences of adults until the synchronous eruption in June (Fig. 2).

## DISCUSSION

Presumably there are only slight differences between trappability of our Central European *Pardosa* species due to their morphological and locomotory similarities (personal observation, further evidence is needed). Relevant data therefore probably prove real dominance relations, in contrast to those data of the total spider catch. Thus, we consider *P. agrestis* as the most abundant species of the genus in the studied fields and field margins. While *P. prativaga* has a distinct preference for the grassy margin,

*P. agrestis* seems to have a slight preference for the wheat field. This phenomenon determines their different significance in pest control. Kromp and Steinberger (1992) published data about a pitfall-survey of a grassy field margin and an adjacent wheat field in Austria, and also found *P. agrestis* to be the dominant species of the genus in the field but not in the margin at all. Their results are opposed to the margin-preference of *P. prativaga*.

The number of species of the genus in our study is surprisingly not much lower when compared to the results of Jedlicková (1988) considering that she collected 21,160 spider individuals by means of sweeping, squares, pitfall traps and individual collecting. In this study 13 *Pardosa* species were found in a wide variety of habitats in Czechoslovakia. Like us, Steinberger and Kromp (1993) also found 8 species of *Pardosa* in their pitfalls in a potato field in Austria; 5 of them were also present in Kartal. Janssens and De Clercq (1986) published a species list in which the presence of 11 *Pardosa* species can be seen in arable lands in Belgium.

Results also suggest that even the very narrow margins are important habitats in agricultural landscapes, potentially contributing to the spiders that inhabit the fields.

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