

DENSITY AND THE SPECIES STRUCTURE OF *THYSANOPTERA* (THRIPS) IN WINTER RYE AND OAT CROPS

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Accepted: May 17, 2005

Abstract: The studies were carried out in Wielkopolska region (western Poland) in oat and winter rye cultures. Density and species structure of *Thysanoptera* were studied. Average density of adult *Thysanoptera* on oat reached 371.4 individuals/m², and was higher than on rye, where it reached 107.5 individuals/m². *Limothrips cerealium* Haliday was a dominant species on oat as well as on winter rye.

Key words: *Thysanoptera*, oat, winter rye, density, species structure

INTRODUCTION

Thysanoptera (thrips) are an order of widespread tiny herbivorous insects that occur both on wild plants and on crops. Nine of species according to Zawirska (1971, 1988) are pests of grasses grown for seed and of cereal crops. The recent years characterized by mild winters and warm and dry spring seasons has favoured an increased incidence of those insects.

During last several years the appearance of *Limothrips cerealium*, which is the pest of cereals, attracts special attention. Under favourable microclimatic conditions swarming of the species was observed in central part of Wielkopolska region.

The objective of the study was to determine the density and species structure of *Thysanoptera* in winter rye and oat crops.

MATERIAL AND METHODS

The survey was conducted in central Wielkopolska (Grand Poland) in winter rye and oat crops from mid-May to harvest in 2003. In two-week intervals 10 samples were collected from the crops using a quadrat frame with a side of 0.25 m. Within the quadrat all plants were cut and, subsequently, the samples were processed through a Berleze funnel. The number of *Thysanoptera* obtained were related to the area of 1 m². The number of *Thysanoptera* per 1 tiller and the number of tillers from which the in-

sects were driven were calculated. The species affiliation of adult *Thysanoptera* was identified using Priesner's key (1964), and the larvae were treated in bulk.

RESULTS AND DISCUSSION

The average population density of adult *Thysanoptera* on oat was 371.4 individuals/m² and the density of larvae was 506.1 ind./m². The combined average density of larvae and adults was 877.5 ind./m². The peak density of adult *Thysanoptera* occurred at first decade of July reaching 1086.4 ind./m². The highest density of larvae was found in third decade of June 1822.4 ind./m² (Table 1).

The average density of adult *Thysanoptera* on rye crop was less than one third of that on oat, the count being 107.5 ind./m². The density of larvae was one fifth of that on oat 101.1 ind./m². The maximum density of larvae and adults was recorded in the last decade of June, ca. 2 weeks earlier than that recorded in oat. The density of adults on that date was 211.2 ind./m² and that of larvae 198.4 ind./m², both figures being many times lower than their counterparts for oat. The combined density of larvae and adults was 208.5 ind./m², being much lower than that on oat (Tables 1, 2). According to the surveys by Żurańska (1985) and Żurańska et al. (1991) conducted in the Olsztyn area the number of *Thysanoptera* per 1 tiller was 0.7-0.9 and 0.1-0.6 for wheat and 0.7-1.4 for rye. The numbers for central Wielkopolska are many times higher than those reported above. The seasonal average was 1.9 adults and 1.5 larvae per 1 tiller for rye. In oat it was 3.7 adults and 3.4 larvae.

All species found on studied crops, except for *Aeolothrips intermedius* Bagnall, are described by Zawirska (1971, 1988) as pests of grasses grown for seed and of cereal crops. *A. intermedius* is a predator, feeding e.g. on larvae of *Thysanoptera*. It was found only on oat, and its share was only 1.2% (Tables 1, 2).

Limothrips cerealium Haliday, *Limothrips denticornis* Haliday and *Frankliniella tenuicornis* (Uzel) were the core species on the crops investigated in this study with the total incidence of 82.7% on oat, and 88.3% on rye, with *Haplothrips aculeatus* (Fabr.) appearing instead of *F. tenuicornis* on rye (Tables 1, 2).

L. cerealium was by far the most numerous species both on oat and on rye. Its average density during the season was several times higher than that of the remaining species averaging 192.2 ind./m² (2.5 ind./tiller) and 61.1 ind./m² (1.1 ind./tiller) (Tables 1, 2). The study of numerical change of *L. cerealium* on both crops revealed that the insect occurred on oats and on rye on the same date. Both on oat and on rye an increase in density was recorded in third decade of June. On rye the increase was followed by a substantial decline whereas on oat the density continued to increase reaching the peak in first decade of July being followed by the decline until harvest time (Tables 1, 2). This species was not reported by other investigators who made surveys of the incidence of *Thysanoptera* on different crops (Adomas 1982; Gromadska and Rolko 1971; Luterek 1977; Żurańska 1985) but Zawirska (1988) stated that it is of sporadic occurrence.

Average density of *L. denticornis* on oat was 48.2 ind./m² (0.6 ind./tiller) and it was about one fourth of that of *L. cerealium* (Table 1). On rye the density of that species was also about one third of that of *L. cerealium* averaging 20.8 ind./m² (0.4 ind./tiller) (Table 2). It appeared on oat and on rye starting from mid-May. How-

Table 1. Density (individuals/m²), number of individuals per 1 tiller and percentage share of Thysanoptera on oat in 2003

Date	12.05.		26.05.		09.06.		26.06.		07.07.		21.07.		04.08.		Average		
	ind./m ²	ind./tiller	ind./m ²	ind./tiller	ind./m ²	ind./tiller	ind./m ²	ind./tiller	ind./m ²	ind./tiller	ind./m ²	ind./tiller	ind./m ²	ind./tiller	ind./m ²	ind./tiller	%
<i>Aeolothrips intermedius</i> Bagnall					9,6	0,1	16,0	0,2	4,8	0,1			4,3	0,06	1,2		
<i>Anaphothrips obscurus</i> (Müller)			1,6	0,02			99,2	1,3	92,8	1,2			1,6	0,02	27,9	0,4	7,5
<i>Frankliniella tenuicornis</i> (Uzel)					3,2	0,05			32,0	0,4	32,0	0,4	8,0	0,1	66,5	0,8	17,9
<i>Thrips physapus</i> Linne					4,8	0,1	19,2	0,2	1,6	0,02			3,7	0,05	1,0		
<i>Stenothrips graminum</i> Uzel					19,2	0,3	8,0	0,1	12,8	0,2			5,7	0,09	1,5		
<i>Chirothrips manicatus</i> Haliday			1,6	0,02			4,8	0,1	1,6	0,02			3,2	0,04	1,6	0,03	0,4
<i>Limothrips denticornis</i> Haliday	1,6	0,03	1,6	0,02	1,6	0,03	155,2	2,0	94,4	1,2	81,6	1,0	1,6	0,02	48,2	0,6	13,0
<i>Limothrips cerealium</i> Haliday	4,8	0,1	22,4	0,3	67,2	0,9	382,4	4,9	464,0	5,7	371,2	4,8	33,6	0,5	192,2	2,5	51,8
<i>Haplothrips aculeatus</i> (Fabr.)			1,6	0,02			1,6	0,02	52,8	0,7	76,8	1,0	16,0	0,2	21,3	0,3	5,7
Total adults	6,4	0,1	28,8	0,4	91,2	1,3	755,2	9,7	1086,4	13,5	568,0	7,3	64,0	0,9	371,4	4,8	
Larvae			1,6	0,02	12,8	0,2	1822,4	23,2	1112,0	13,8	579,2	7,4	14,4	0,2	506,1	6,4	
Total	6,4	0,1	30,4	0,4	104	1,5	2577,6	32,9	2198,4	27,3	1147,2	14,7	78,4	1,1	877,5	11,1	

Table 2. Density (individuals/m²), number of individuals per 1 tiller and percentage share of Thysanoptera on winter rye in 2003 year

Date	12.05.		26.05.		09.06.		26.06.		07.07.		21.07.		Average		%
	ind./m ²	ind./tiller	ind./m ²	ind./tiller	ind./m ²	ind./tiller	ind./m ²	ind./tiller	ind./m ²	ind./tiller	ind./m ²	ind./tiller	ind./m ²	ind./tiller	
<i>Anaphothrips obscurus</i> (Müller)	1,6	0,03					11,2	0,2	6,4	0,1			3,2	0,06	3,0
<i>Frankliniella tenuicornis</i> (Uzel)							6,4	0,1	4,8	0,1	1,6	0,03	2,1	0,04	2,0
<i>Thrips physapus</i> Linne			1,6	0,02			3,2	0,1	14,4	0,2			3,2	0,05	3,0
<i>Stenothrips graminum</i> Uzel													0,3	0,01	0,3
<i>Chirothrips manicatus</i> Haliday	8,0	0,2	1,6	0,1	1,6	0,03	9,6	0,2	1,6	0,03			3,7	0,09	3,4
<i>Limothrips denticornis</i> Haliday	30,4	0,5	3,2	0,05	57,6	1,1	28,8	0,5	4,8	0,1			20,8	0,4	19,3
<i>Limothrips cerealium</i> Haliday	48,0	0,9	56,0	0,9	65,6	1,2	124,8	2,1	28,8	0,5	43,2	0,8	61,1	1,1	56,8
<i>Haplothrips aculeatus</i> (Fabr.)			3,2	0,05	6,4	0,1	27,2	0,5	35,2	0,6	6,4	0,1	13,1	0,2	12,2
Total adults	88,0	1,7	65,6	1,1	132,8	2,5	211,2	3,7	96,0	1,6	51,2	0,9	107,5	1,9	
Larvae	60,8	1,2	115,2	1,6	129,6	0,8	198,4	3,4	51,2	0,9	51,2	0,9	101,1	1,5	
Total	148,8	2,8	180,8	2,7	262,4	3,3	409,6	7,1	147,2	2,5	102,4	1,8	208,5	3,4	

ever, on rye it was present until first decade of July whereas on oat it lasted until harvest time. On rye the peak density was observed in first decade of June whereas on oat it occurred two weeks later (Tables 1, 2).

According to Gromadska and Rolko (1971) who conducted trials with oat in the vicinity of Toruń the species accounted for 70% of all species occurring there. The authors reported its maximum density at flowering to be 3568 ind./m².

Average density of *F. tenuicornis* on oat in the season was 66.5 ind./m² (0.8 ind./tiller). The maximum density was observed in the end of first decade of July and it reached 332.8 ind./m² (4.1 ind./tiller) (Table 1).

H. aculeatus was observed on rye in third decade of May. Average density of this species was 13.1 ind./m² (0.2 ind./tiller). The maximum density was noted in first decade of July and reached 35.2 ind./m² (0.6 ind./tiller) (Table 2).

Worth of noting is the fact that *Stenothrips graminum* considered as an oat specific pest occurred in this study but in very small numbers, with the percentage of 1.5% only (Table 1).

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POLISH SUMMARY

ZAGĘSZCZENIE I STRUKTURA GATUNKOWA THYSANOPTERA (PRZYŁŻEŃCÓW) NA UPRAWIE ŻYTA OZIMEGO I OWSA

Badania prowadzono w Środkowej Wielkopolsce na uprawach owsa i żyta ozimego w okresie od połowy maja do żniw w 2003 r. Średnie zagęszczenie dorosłych *Thysanoptera* na owsie wynosiło 371,4 os./m², natomiast zagęszczenie larw – 506,1 os./m². Łącznie średnie zagęszczenie larw i osobników dorosłych wynosiło 877,5 os./m². Średnie zagęszczenie dorosłych *Thysanoptera* na uprawie żyta było ponad 3-krotnie niższe niż na uprawie owsa i wynosiło 107,5 os./m² a larw 101,1 os./m² i było 5 razy niższe niż na owsie.

Zdecydowanie najliczniejszym gatunkiem zarówno na owsie jak i na życie był *Limothrips cerealium* Haliday, którego średnie zagęszczenie w sezonie kilkakrotnie przewyższało zagęszczenie pozostałych gatunków i wynosiło odpowiednio 192,2 os./m² (2,5 os./pęd) oraz 61,1 os./m² (1,1 os./pęd).