

## INTENSITY OF OCCURRENCE OF ERIOPHYOID MITES (*ACARI, ERIOPHYOIDEA*) AND SPIDER MITES (*ACARI, TETRANYCHIDAE*) ON WILD GRASSES

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*Accepted: November 20, 2003*

**Abstract:** In the years 1999–2001 occurrence of eriophyoid mites (*Eriophyoidea*) and spider mites (*Tetranychidae*) on wild grasses growing in Wielkopolska region was investigated. Seven species of eriophyoid mites and three of spider mites were found on 24 grass species. Eriophyoid mites infested 38% and spider mites 57% of all examined samples. The most frequent inhabited grass species by eriophyoid mites were *Agropyron repens* and *Lolium perenne*, while by spider mites *Dactylis glomerata* and *Bromus mollis*.

**Key words:** eriophyoid mites, spider mites, grasses, intensity of occurrence

### INTRODUCTION

Eriophyoid mites (*Eriophyoidea*) occurring on grasses are pest of significant importance that can cause economical losses in forage and seed grasses, and cereals as well (Amrine and Stasny 1994; Frost and Redland 1996; Oldfield and Proeseler 1996). They inhabit numerous plant species and along with carried out surveys this list is being extended (Davis et al. 1982; Amrine and Stasny 1994).

In Poland more intensive studies on eriophyoid mites occurring on grasses have been undertaken just in recent years (Boczek et al. 2000; Kozłowski 2000; Skoracka and Boczek 2000).

Spider mites (*Tetranychidae*) are well recognized pests of numerous plant species that belong to different botanical families. Worldwide literature provides scanty data on mite occurrence on grasses and their harmfulness (Pritchard and Baker 1955; Boczek and Kropczyńska 1964; 1965).

In Poland studies on occurrence and harmfulness of spider mites on grasses have not been conducted so far. Only Boczek and Kropczyńska (1964) reported appearance of *Schizotetranychus parasemus* Pritchard & Baker on *Dactylis glomerata*.

The aim of undertaken studies was to identify species of eriophyoid mites (*Eriophyoidea*) and spider mites (*Tetranychidae*) occurring on wild growing grasses and to investigate their influence on plant healthiness.

## MATERIAL AND METHODS

Studies on occurrence of eriophyoid mites and spider mites on grasses were carried out in the years 1999–2001 in the climatic subregion of Wielkopolska. Each year samples were collected from different wild grass species starting at grass flowering growth stage until August. Each sample included 5 plants (eriophyoid mites) and 15 plants (spider mites). Plants were examined by mean of microscope and the following parameters were recorded: number of mites, site of occurrence and degree of plant injury. Collected eriophyoid mites were submerged in permanent slides according to method of Keifer (Keifer 1952), while spider mites were initially preserved in Oudemans mixture and then in permanent slides.

Then material was identify according to Keifer (1944; 1952), Proeseler (1972), Jeppson et al. (1975), Amrine (1997), Sukhareva (1977), Pritchard and Baker (1955), Boczek and Kropczyńska (1964). Grass species were determined according to Rostafiński and Seidl (1973), Grau et al. (1984). The occurrence of particular eriophyoid mites and spider mites as well as their percentage content on different grass species were evaluated.

## RESULTS

Twenty three out of 40 examined grass species (*Gramineae*) collected in Wielkopolska province were infested by eriophyoid mites (*Eriophyoidea*), while twenty four by spider mites (*Tetranychidae*).

Eriophyoid mites infested 38% and spider mites 57% of all examined samples.

Nine eriophyoid mites species were diagnosed and six out of 9 were identified as *Aceria* spp. and one to *Eriophyes* sp. Sampled spider mite population contained three mite species and two were diagnosed to species and one to *Bryobia* sp.

Identified eriophyoid mites are following: *Abacarus compactus* (Sukhareva) found out only on *Bromus mollis*; *Abacarus hystrix* (Nalepa) on 18 grass species and the most abundantly on *Festuca pratensis*, *Festuca rubra*, *Hordeum murinum*, *Phalaris arundinacea*, and *Poa angustifolia*; *Aceria tenuis* (Nalepa) only on *Dactylis glomerata* and *Poa pratensis*; *Aceria tosichella* (Keifer) on 11 grass species and the most numerously on *Avenastrum pratense*, *Poa pratensis*, *Bromus mollis* and *Dactylis glomerata*; *Aceria* spp. only on *Alopecurus pratensis* and *Lolium perenne*; *Aculodes mckenziei* (Keifer) on 15 grass species and *Poa trivialis*, *Arrhenatherum elatius*, *Trisetum flavescens*, *Bromus racemosus* and *Bromus tectorum* were the most infested; and finally *Aculodes dubius* (Nalepa) on 9 grass species, *Phleum pratense* and *Bromus sterilis* were inhabited the most (Tab. 1).

Identified spider mites are as follows *Schizotetranychus parasemus* (Pritchard and Baker) discovered on 14 grass species and the most frequently infested *Dactylis glomerata*, *Bromus tectorum* and *Hordeum murinum*; *Tetranychus urticae* (Koch) on 13 grass species: *Hordeum murinum*, *Setaria italica*, *Agropyron repens*, *Phalaris arundinacea* and *Bromus erectus* were the most infested and finally *Bryobia* sp. on *Poa pratensis*, *Phleum pratense*, *Lolium perenne* and *Dactylis glomerata* (Tab. 2).

Table 1. Percentage contents of eriophyoid species on wild grasses (1999–2000 years)

Grass species	A. <i>compactus</i>	A. <i>hystrix</i>	A. <i>tenuis</i>	A. <i>tosichella</i>	Aceria spp.	A. <i>mckenziei</i>	A. <i>dubius</i>	No. of colonized plant samples
<i>Agropyron repens</i> (L.) P.B.	0	45.2	0	13.9	0	29.2	11.7	10
<i>Agrostis vulgaris</i> With.	0	95.0	0	0	0	5.0	0	2
<i>Alopecurus pratensis</i> L.	0	27.0	0	7.5	13.4	23.2	28.9	8
<i>Apera spica-venti</i> (L.) P.B.	0	82.2	0	0	0	17.8	0	3
<i>Arrhenatherum elatius</i> (L.) P.B.	0	16.6	0	0	0	83.4	0	1
<i>Avenastrum pratense</i> (L.) Opiz.	0	34.8	0	65.2	0	0	0	2
<i>Bromus erectus</i> Huds.	0	0	0	50.0	0	50.0	0	2
<i>Bromus inermis</i> Leyss.	0	34.3	0	39.2	0	22.2	4.3	3
<i>Bromus mollis</i> L.	6.9	0	0	54.7	0	16.2	22.2	9
<i>Bromus racemosus</i> Huds.	0	11.1	0	0	0	63.8	25.1	3
<i>Bromus sterilis</i> L.	0	0	0	26.1	0	0	73.9	2
<i>Bromus tectorum</i> L.	0	37.5	0	0	0	62.5	0	2
<i>Dactylis glomerata</i> L.	0	14.9	5.3	51.8	0	28.0	0	19
<i>Festuca pratensis</i> Huds.	0	100	0	0	0	0	0	2
<i>Festuca rubra</i> L.	0	100	0	0	0	0	0	1
<i>Hordeum murinum</i> L.	0	100	0	0	0	0	0	3
<i>Lolium perenne</i> L.	0	68.5	0	0	4.8	7.1	19.6	8
<i>Phalaris arundinacea</i> L.	0	100	0	0	0	0	0	2
<i>Phleum pratense</i> L.	0	1.0	0	6.0	0	15.0	78.0	5
<i>Poa angustifolia</i> L.	0	100	0	0	0	0	0	2
<i>Poa pratensis</i> L.	0	30	3.3	66.7	0	0	0	3
<i>Poa trivialis</i> L.	0	0	0	0	0	85.7	14.3	3
<i>Trisetum flavescens</i> (L.) P.B.	0	0	0	25.5	0	74.5	0	3

Table 2. Percentage contents of spider mite species on wild grasses (1999–2001 years)

Grass species	<i>S. parasemus</i>	<i>T. urticae</i>	<i>Bryobia</i> sp.	Number of colonized plant samples
<i>Agropyron repens</i> (L.) P.B.	5.8	49.3	0	69
<i>Alopecurus pratensis</i> L.	14.0	26.0	0	50
<i>Anthoxanthum odoratum</i> L.	0	25	0	8
<i>Apera spica-venti</i> (L.) P.B.	0	5.9	0	17
<i>Arrhenatherum elatius</i> (L.) P.B.	12.6	31.0	0	87
<i>Avenastrum pratense</i> (L.) Opiz.	0	50	0	2
<i>Bromus arvensis</i> L.	0	34.3	0	3
<i>Bromus erectus</i> Huds.	10.4	46.3	0	67
<i>Bromus inermis</i> Leyss.	11.1	33.3	0	18
<i>Bromus mollis</i> L.	10.7	38.1	0	84
<i>Bromus racemosus</i> Huds.	0	7.7	0	18
<i>Bromus tectorum</i> L.	33.3	0	0	3
<i>Dactylis glomerata</i> L.	44.4	25.1	0.3	363
<i>Festuca pratensis</i> Huds.	0	16.4	0	13
<i>Holcus mollis</i> L.	20.0	50.0	0	8
<i>Hordeum murinum</i> L.	33.3	66.7	0	3
<i>Lolium multiflorum</i> Lam.	0	11.1	0	9
<i>Lolium perenne</i> L.	6.1	9.1	1.5	66
<i>Phalaris arundinacea</i> L.	6.3	46.9	0	32
<i>Phleum pratense</i> L.	31.4	28.6	2.9	35
<i>Poa pratensis</i> L.	8.0	30.8	3.8	26
<i>Poa trivialis</i> L.	0	8.7	0	23
<i>Setaria italica</i> (L.) P.B.	0	50.0	0	4
<i>Trisetum flavescens</i> (L.) P.B.	0	20.0	0	5

## CONCLUSION

Eriophyoid mites infested 38% and spider mites 57% of all diagnosed samples.

The most frequently infested wild grass species *Agropyron repens* (91% of samples) while the least *Arrhenatherum elatius* (8% of samples). The most frequently occurring eriophyoid mite species were *Abacarus hystrix* and *Aculodes mckenziei*. On some grass species their present was accompanied by other eriophyoid species and *Aculodes dubius* and *Aceria tosichella* were found the most often (Tab. 1).

Spider mites infested the most frequently the following grass species: *Dactylis glomerata*, *Arrhenatherum elatius*, *Phleum pratense*, *Bromus mollis*, *Bromus erectus*, *Agropyron repens*, and *Phalaris arundinacea*.

All identified species of eriophyoid mites and spider mites appeared mainly on upper leaf blade and the most frequently in grooves between nerves. Eriophyoid mites and spider mites also preferred upper leaf blade on grasses with smooth leaf surface like *Dactylis glomerata*. Choice of this place by eriophyoid mites and spider mites resulted in blowing them what became significant on migration process on other plants.

Some eriophyoid mites (*A. dubius* and *A. hystrix*) and two-spotted spider mite (*Tetranychus urticae* Koch) inhabited also leaf undersides. Eriophyoid mites, particularly *A. mckenziei* occurred on inflorescences of some grass species. According to some authors eriophyoid mites on grasses exhibit specific feeding preferences to plant host species and plant part for infestation as well (Nault and Styer 1969; Boczek et al., 2000; Skoracka 2000). Spider mites acted similarly. *Schizotetranychus parasemus* infested the most frequently *Dactylis glomerata*, *Phleum pratense*, *Bromus inermis*, *Alopecurus pratensis*, while in contrast seldom *Agropyron repens*, *Phalaris arundinacea* and *Poa pratensis*. *Tetranychus urticae* Koch was found numerously on *Agropyron repens*, *Phalaris arundinacea*, *Bromus erectus* and *Bromus mollis*, and infrequently on *Bromus racemosus* and *Poa trivialis*. Both spider mite species rarely were recorded on *Lolium perenne* (Tab. 2). *Schizotetranychus parasemus* appeared on a plant mostly in leaf sheath and on leaf blade near a base. *Tetranychus urticae* chose for its settlement other areas of leaf blade i.e. middle part or near a tip.

Eriophyoid mites and spider mites did not occur jointly on the same grass species Kozłowski et al. (1995) described similar phenomena based on studies on leaves of different apple cultivars.

Identified eriophyoid mites species and spider mites caused external plant injuries. On some grass species, discoloration, matting and bronzing were observed. These injuries resulted mostly from *A. hystrix* and *A. mckenziei* and mites *Tetranychus urticae* feeding. Eriophyoid mites *A. dubius* caused on few grass species curling of leaf edges, resulting in a strap like appearance and stunting plant growth.

Numerous occurrence of eriophyoid mites on grasses in many countries leads to significant economical loses resulting not only from their direct feeding but fungal, bacterial and virus diseases transmitted by these pests. Symptoms of their feeding are different injuries such as discoloration, internodes and stem shortening, leaf curling, witch broom appearance and plant sterility (Davis et al. 1982; Amrine and Stasny 1994).

It has been illustrated that *Abacarus hystrix* is a vector for *ryegrass mosaic virus* (RMV), while *Aceria tosichella* for *wheat streak mosaic virus* (MSMV) (Boczek 1999; Jeżewska and Wieczorek 1998; Kozłowski 2000). Wild grasses are ideal place for survival for eriophyoid mites and spider mites in this environment that each year becomes a source of infestation material for arable crops.

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## POLISH SUMMARY

### NASILENIE WYSTĘPOWANIA SZPECIELI (*ACARI: ERIOPHYOIDEA*) ORAZ PRZĘDZIORKÓW (*ACARI: TETRANYCHIDAE*) NA TRAWACH DZIKO ROSNĄCYCH

W latach 1999–2001 na terenie wielkopolskiego subregionu klimatycznego przeprowadzono badania nad występowaniem szpecieli (*Eriophyoidea*) i przędziorków (*Tetranychidae*) na trawach (*Gramineae*). Na 24 gatunkach traw dziko rosnących stwierdzono występowanie 7 gatunków szpecieli (*A. compactus*, *A. hystrix*, *A. tenuis*, *A. tosichella*, *Aceria spp.*, *A. mckenziei*, *A. dubius*) i 3 gatunki przędziorków (*S. parasemus*, *T. urticae*, *Bryobia sp.*). Szpeciele wystąpiły 38% wszystkich zbadanych prób traw, najczęściej zasiedlając *Agropyron repens* i *Lolium perenne*. Na badanych gatunkach traw najczęściej występowały dwa gatunki szpecieli: *Abacarus hystrix* i *Aculodes mckenziei*. Przędziorki zasiedliły 57% wszystkich badanych prób, najczęściej występując na *Dactylis glomerata* i *Bromus mollis*. Na trawach najczęściej występował *Schizotetranychus parasemus* i *Tetranychus urticae*. Miejscem występowania tak szpecieli jak i przędziorków na roślinach żywicielskich była głównie górna strona liści. Niektóre gatunki szpecieli (*A. dubius*, *A. tosichella*) zasiedlały także dolną stronę liści, pochwy liściowe i kwiatostany. Przędziorek *Schizotetranychus parasemus* zasiedlał również pochwy liściowe traw. Liczne występowanie *A. hystrix*, *A. mckenziei* i *T. urticae* na niektórych gatunkach traw powodowało zmatowienie i zbrązowienie liści tych roślin.