

THE SPREAD OF FUNGI ERSYPHACEAE TUL. & C. TUL ON THE WOODY PLANTS AT THE CITY GREEN PLANTATIONS IN LITHUANIA

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The aim of our work: to identify Erysiphaceae species injuring ornamental woody plants at city plantations and their spread in Lithuania. During 2009–2016 agents of powdery mildew at city green plantations were monitored, Alytus city was taken as a model. There were evaluated ornamental plants growing at protective street areas and recreational plantations: 35 genus, 48 species, 11 varieties. Powdery mildew fungi, the agent of leaf diseases, were detected at street plantations: 3 genus, 5 species and at recreational plantations – fungi of 3 genus and 9 species. Powdery mildew mostly injures plants of *Quercus* L., *Acer* L., *Berberis* L., etc. genus. During the research period mostly violent were Erysiphe R. Hedw. ex DC. genus powdery mildew agents: *E. alphitoides*, *E. berberidis*, *E. euonymi*, *E. flexuosa*, *E. penicillata*, *E. palczewskii* and *E. syringae*. At recreational plantations fungi *Sawadaea bicornis* has injured *Acer ginnala* most severely (average grade of injury – 3.33 ± 0.4), less severe *S. tulasnei* was on *Acer platanoides* (grade 1–3.3). *Podosphaera pannosa* injured *Rosa* spp., injury grade 1.27 ± 0.03 – 1.54 ± 0.03 . There were detected *Phyllactinia fraxini*, rare species in Lithuania, which have injured *Fraxinus excelsior* L. by 1.17 ± 0.95 in 2012 and in 2013 – by 1.5 ± 0.84 .

Key words: powdery mildew agents, species, spread, city green plantations, Lithuania.

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INTRODUCTION

The first to describe Erysiphaceae was K. Lineus (1753), naming them *Mucor erysiphe* (Grigaliūnaitė, 1997). The first data about fungi Erysiphaceae in Lithuania was given by J. Jundzilas (Jundził, 1830). The first special researches on powdery mildew were started at 1923–1927 after the establishment of the first laboratories of phytopathology: at Kaunas Botanical Garden, at department of Botany of high schools in Vilnius, at Plant Protection Station in Dotnuva. V. Vilkaitis (1927) gathered and

systemized herbarium data at Dotnuva district. The data was subsequently supplemented by the pioneer of phytopathology in Lithuania – prof. A. Minkevičius (1927, 1935). In 1926 K. Brudza began collecting herbarium of plants injured by powdery mildew, investigated the morphology and physiology of these fungi. Research data was summarized comprehensively and published in 1934: describing injuries of 233 plant species, presenting fungi morphological features, giving location site. A. Michalski (1936) working at Vilnius region, occupied by Poland at that time, has supplemented research on Erysiphaceae

with new data, and at southwest of Lithuania in 1901–1930 work was carried out by J. Trzebiński (1937). Since 1957 Erysiphaceae at the laboratory of phytopathology at Vilnius Botanical Institute were researched by S. Jermalavičiūtė (Stanevičienė) (1957), O. Špokauskienė (1959–1980), L. Šidla (1969–1973) (Grigaliūnaitė, 1997; Grigaliūnaitė & Špokauskienė, 1980). B. Grigaliūnaitė was carrying out her research work on powdery mildew agents since 1971 till 2014, has published a monography on her work basis (Grigaliūnaitė, 1997).

Erysiphaceae fungi develop quite actively, they occupy new ecological niches, injure more new plants. Therefore they have to be constantly examined, new aggressive species and races have to be detected (Grigaliūnaitė 1997, Heluta et al. 2009, Kazlauskaitė 2012, Lubell et al. 2011). Erysiphaceae fungi are widely spread on woody plants of city green plantations (Grigaliūnaitė et al. 2007).

Systematic studies of ornamental plants' vulnerability to powdery mildew and other diseases are carried out at Kaunas Botanical Garden of Vytautas Magnus University since 1978. In order to gather information on plants grown at green plantations at the territories assigned by the city municipality, to allow the proper assessment of plant condition, manage and predict it, the municipalities since 2009 are also engaged in constructional work: Alytus, the Southern Lithuanian city, "The monitoring of the state of Alytus city greenery and green plantations" (Confirmation ..., 2007). The data of this research work on the spread of plant diseases among urban greenery has a scientific as also practical meaning.

The aim of the work: to detect species of fungi Erysiphaceae, injuring woody plants at city green plantations, ascertain their spread in Lithuania.

MATERIAL AND METHODS

The evaluation of phytopathological state of ornamental woody plants has been done from July

till August 2009–2016. The spread of powdery mildew at city green plantations with mostly abundant variety of tree species or those with newly planted young trees has been assessed at Alytus city: 7 parks – Gulbynės, Jaunimo, Kurorto, Likiškių, Miesto sodas, Putinų, Žuvedrų kalva; 4 squares – Studentų, Senamiesčio, Rotušė square and Pirmojo Alytus square; 19 streets – Birutės, A. Jonyno, Jotvingių, A. Juozapavičiaus, Kauno, Likiškėlių, Margio, Naujojoji, Pulko, Putinų, Rūtų, Sakalausko, Statybininkų, Sudvajų, Suvalkų, Volungių, Vilniaus, Vilties, Žuvinto. The evaluation was conducted on ornamental woody plants of protective street and recreational plantations: 35 genus, 48 species, 11 varieties.

Disease intensity was rated in grades: 0 grades – isolated plots on leaves covered with coating typical to mildew (white, powdery plaque), injured less than 10% of plant leaves; 1 grade – injured 11–30% of leaves; 2 grades – injured 31–60%; 3 – injured 61–80%, plant wilt noticeably; 4 grades – injured more than 81% of plant surface, plant wilt.

Disease intensity (average injury grade) calculated using the formula:

$$V = \Sigma(n \cdot b) / N; (1)$$

where V – average injury grade, $\Sigma(n \cdot b)$ – the sum of multiplications of equally injured (in grades) plant numbers and injury value, N – the number of valued plants.

Fungi were identified visually (according to disease symptoms and disease agents – fungi morphological features) as also using the method of moist chambers to isolate pure fungi cultures and identify by microcopying in accordance to characterizers: of B. Grigaliūnaitė study "Lithuanian fungi *Erysiphales* 3(1)" (1997) and W. A. Sinclair, H. H. Lyon (2005) code. Fungal names described in accordance with generally accepted (interactive) code *Index fungorum*.

RESULTS AND DISCUSSION

During 2009–2016 the monitoring on the state of greenery and green plantations was carried out at recreational and protective street plantations.

At the protective green plantations of Alytus city there were detected 5 species of powdery mildew agents on 5 genus, 6 species and 1 variety of plants, at the recreational plantations – fungi of 3 genus, 9 species on plants of 8 genus, 13 species and 2 varieties (Table 1). Every year in Lithuania powdery mildew pathogens invade maple trees (*Acer negundo* L., *A. platanoides* L., *A. tataricum* L.), *Quercus robur* L., *Syringa vulgaris* L., *Caragana arborescens* Lam., *Berberis thunbergii* DC, *Fraxinus excelsior* L. in particular at dry, warm seasons with rainy periods.

One species of powdery mildew mostly injure only one host plant (Brundza 1934). *Acer* L. family plants are injured by powdery mildew agents of two species. *Sawadaea bicornis* (Wallr.) Homma (= *Uncinula bicornis*) injure several species of maple trees: very often on *Acer negundo* L., *A. ginnala* Maxim, often – *A. tataricum* L., very rarely – *A. pseudoplatanus* L. (Grigaliūnaitė, 1997). In 2013 at recreational green plantations this kind of powdery mildew was detected on *A. pseudoplatanus* ‘Atropurpureum’ and in 2012 has strongly injured *A. tataricum* L., each year *A. negundo* ir *A. ginnala* (Table 1) were injured at a various injury grade. Powdery mildew has done no damage to *A. pseudoplatanus* (27 trees) and its variety ‘Purpureus’ (24 trees) also – *A. sacharinum* at Gulbynes park and Miesto sodas (5) – recreational greeneries, at street plantations – *Acer negundo* (in Jotvingių st., 1 trees) and *Acer saccharinum* (Putinų st. – 2 trees). *A. platanoides* is injured by the other powdery mildew species – *Sawadaea tulasnei* (Fuckel) Homma (= *Uncinula tulasnei*, *U. aceris*). It spread from the upper leaves down to bottom. In 2014 injuries of 1 grade were found on 100% of *A. platanoides* variety ‘Deborah’ grown at Birutes street (13 trees, planted in 2012). At street greeneries this mildew did not injure varieties of *A. platanoides*: ‘Columnare’ (S. Dariaus and S. Girėno st. – 36 trees, Birutės st. – 13), ‘Eurostar’ – Vilnius st. (32 trees) and Suvalkai st. (32), and at recreational green plantations had not injured trees of ‘Schwedleri’ (Jaunimo and Putinų parks, 24 trees).

Fungi *Podosphaera pannosa* (Wallr.) de Bary (= *Sphaerotheca pannosa*) injuring roses develop more intensively at a shady environments. This fungi begins its spread from the upper side (the bottom side is hairy) of the bottom leaves. It injures roses’ sprouts and upper leaves strongly (Grigaliūnaitė 1997). During the research time roses grown in shades (Miesto sodas park) were affected severely and meanwhile injuries found at Jaunimo and Senamiescio parks were slight. *Phyllactinia fraxini* (DC.) Fuss (= *P. suffulta*) is rarely detected in Lithuania on *Fraxinus excelsior* L., in 2013–2014 was noticed only at green plantations of Kaunas street, and at Jaunimo park and Studentu square (13 trees) this kind of mildew was not detected at all.

Erysiphe genus fungi are common in Lithuania (Brundza 1934, Grigaliūnaitė 1997, Špokauskienė 1965). 7 species were detected at green plantations (Table 1). In 1935 A. Minkevičius has claimed that *Microsphaera alphitoides* (according *Index fungorum* – *Erysiphe alphitoides* (Griffon & Maubl. U. Braun & S. Takam.) improve and injure oak trees, particularly young ones (Brundza 1927, Minkevičius 1927). Sprouts then grow slower, leaves deform, wither, year-increment is not able to mature and become resistless to cold (Brundza 1934). In Lithuania it was described for the first time in 1909. Its epiphytoticities are noticed especially in drier and warmer years. It also settles in colder and wet summers (Grigaliūnaitė, 1997). In July 2009–2012 *E. berberidis* DC. (= *Microsphaera berberidis*) has injured single plants of of *Berberis thunbergii* ‘Purpurea’ varieties, and in 2013–2014 10% of *Berberis thunbergii* at Miesto sodas and Studentu parks were injured by 3 grades. Shrubs grown at Kaunas and Naujoji streets (150 shrubs) were unimpaired. According to the data in the literature, *Caragana arborescens* annually injure *Erysiphe palczewskii* (Jacz.) U. Braun & S. Takam (Brundza 1934, Grigaliūnaitė 1997). During 2012 and 2014 at Miesto sodas and Senamiesčio square powdery mildew injured plants by 2.5 and 1.75 grades. B. Grigaliūnaitė (1997) stated *Erysiphe syringae* Schwein. (= *Microsphaera syringae*) on *Syringa vulgaris* to be very rare, K. Brundza did not manage to discover it. Our data references

Table 1. *Vidutinis powdery mildew fungi on ornamental woody plants at urban greenery in Lithuania, 2009–2016*

Powdery mildew fungi species	Host plants / Number of plants	Average grade of damage								
		2009	2010	2011	2012	2013	2014	2015	2016	
Protective street greeneries										
<i>Erysiphe alphitoides</i> (Griffon & Maubl.) U. Braun & S. Takam. (=Microsphaera alphitoides)	<i>Quercus robur</i> L. / 4	2,25±0,03	1,25±1,45		4±1,12	1,5±1,33	1,4±1,58	1,75±0,22	1±0,12	
<i>E. flexuosa</i> (Peck) U. Braun & S. Takam.	<i>Aesculus hippocastanum</i> L. / 249	1,06±0,02	1,05±0,02	1,01±0,02	1,01±0,02	1,01±0,02	1,21±0,02	1,01±0,03	1,09±0,02	
<i>E. syringae</i> Schwein. (=Microsphaera syringae)	<i>Syringa vulgaris</i> L. / 6	2±0,12	2±0,12	–	–	–	–	–	–	
<i>Phyllactinia fraxini</i> (DC.) Fuss	<i>Fraxinus exelsior</i> L. / 6				1,17±0,95	1,5±0,84				
<i>Sawadaea tulasnei</i> (Fueckel) Homma	<i>Acer platanoides</i> L. / 167						1,01±0,03	1,01±0,03		
	<i>A. platanoides</i> 'Globosum' / 34				1±0,52		1,15±0,16			
Recreational greeneries										
<i>Erysiphe alphitoides</i> (Griffon & Maubl.) U. Braun & S. Takam.	<i>Quercus robur</i> L. / 332	1,61±0,01	1,95±0,01	1,42±0,01	1,52±0,01	1,8±0,01	2,06±0,01	1,28±0,02	2,37±0,02	
<i>E. berberidis</i> DC. (=Microsphaera berberidis)	<i>Berberis thunbergii</i> 'Purpurea' / 80	1±0,07	1±0,07	1±0,07	1±0,07	1,15±0,07	1,37±0,16	1,64±0,17	1,05±0,08	
<i>E. euonymi</i> DC. (=Microsphaera euonymi)	<i>Euonymus europaea</i> L. / 6					1,5±1,33				
<i>E. flexuosa</i> (Peck) U. Braun & S. Takam.	<i>Aesculus hippocastanum</i> L. / 93	1,14±0,06	1,13±0,06	1,13±0,06	2,16±0,04	1,41±0,05	1,37±0,05	1,26±0,07	1±0,11	
<i>E. penicillata</i> (Wallr.) Link (=Microsphaera penicillata)	<i>Spirea arguta</i> Zbel / 23				1,65±0,19					
<i>E. palczewskii</i> (Jacz.) U. Braun & S. Takam. (=Microsphaera palczewskii)	<i>S. latifolia</i> Aiton. / 10				2±0,41					
	<i>Caragana arborescens</i> Lam. / 4									
<i>E. syringae</i> Schwein.	<i>Syringa vulgaris</i> L. / 55	1,8±0,07	2,07±0,07	1,13±0,1	1,05±0,1	1,24±0,09	1,33±0,09	1,14±0,19	1±0,9	
	<i>Acer ginnala</i> Maxim. / 24	1,08±0,23	3,33±0,14	2,58±0,15	2,35±0,02	1,17±0,22	1,63±0,19	3±0,33	1,83±0,17	
	<i>A. negundo</i> L. / 67	1,39±0,07	1,9±0,06	1,58±0,07	1,03±0,07	1,1±0,08	1,37±0,07	3,14±0,24	1,2±0,11	
<i>Sawadaea bicornis</i> (Wallr.) Homma	<i>A. pseudoplatani</i> L. 'Atropurpureum' / 32					1,55±0,15				
	<i>A. tataricum</i> L. / 2					3±2,24				
	<i>A. platanoides</i> L. / 248		1,07±0,02		1±0,02	1,04±0,02	1±0,02	1,86±0,01	1,22±0,02	
<i>S. tulasnei</i> (Fueckel) Homma	<i>A. platanoides</i> 'Globosum' / 33	1,33±0,15	2,03±0,12	1,03±0,17	1,03±0,17	1,11±0,62	1,06±0,17	1,5±0,24	1,63±0,12	
	<i>A. platanoides</i> 'Krimson King' / 9	3,22±0,38	2,89±0,37	1,5±0,33	1±0,65	1,11±0,62	1,44±0,55	1,54±0,55	1,63±0,12	
<i>Podosphaera pinnosa</i> (Wallr.) de Bary (=Sphaerotheca pinnosa)	<i>Rosa</i> sp. / 148				1,27±0,03	1,28±0,03	1,54±0,03	1,31±0,05	1±0,05	

Table 2. Host plants, potentially dangerous mildew fungi in Lithuania (rare*, frequent**, very rare***, very frequent****)

Powdery mildew fungi species, distribution in Lithuania	Observe Host plants, / Number of plants	References
<i>Sawadaea tulasnei</i> (Fuckel) Homma (= <i>Uncinula tulasnei</i>) ****	<i>Acer platanoides</i> : 'Columnare' / 49; 'Deborah' / 13; 'Eurostar' / 32; 'Schwedleri' / 31	Grigaliūnaitė, 1997
<i>Sawadaea bicornis</i> (Wallr.) Homma (= <i>Uncinula bicornis</i>) **	<i>A. pseudoplatanus</i> L. / 27 and cultivars: 'Purpurescens' / 24; <i>A. sacharinum</i> L. / 7	Grigaliūnaitė, 1997
<i>Erysiphe penicillata</i> (Wallr.) Link (= <i>Microsphaera penicillata</i>) **	<i>Alnus glutinosa</i> (L.) Gaertn. / 101	Brundza, 1927; Grigaliūnaitė, 1997
<i>Erysiphe ornata</i> (U. Braun) U. Braun & S. Takam. (= <i>Microsphaera betulae</i>) **	<i>Betula pendula</i> Roth / 365	Brundza, 1927; Grigaliūnaitė, 1997
<i>Phyllactinia guttata</i> (Wallr.) Lév. (= <i>P. suffultata</i>) ***	<i>Carpinus betulus</i> L. / 9	Brundza, 1927; Grigaliūnaitė, 1997
<i>Erysiphe tortilis</i> (Wallr.) Link ***	<i>Cornus alba</i> L. / 42	Brundza, 1934; Grigaliūnaitė & Špokauskienė, 1980
<i>Phyllactinia guttata</i> (Wallr.) Lév. ***	<i>Corylus avellana</i> L. / 4	Grigaliūnaitė, 1997
<i>Podosphaera clandestina</i> (Wallr.) Lév. (= <i>Podosphaera oxyacanthae</i>) *	<i>Crataegus monogyna</i> Jacq. / 44	Brundza, 1934; Grigaliūnaitė, 1997
<i>Oidium</i> sp. *	<i>Fagus silvatica</i> L. / 2	Brundza, 1934; Grigaliūnaitė, 1997
<i>Peronospora cytisi</i> Rostr.	<i>Laburnum anagyroides</i> Medik. / 3	Grigaliūnaitė, 1997
<i>Erysiphe lonicerae</i> DC. (= <i>Microsphaera lonicerae</i>) ****	<i>Lonicera tatarica</i> L. / 10	Minkevičius, 1927
<i>E. berberidis</i> DC. (= <i>Microsphaera berberidis</i>) ***	<i>Mahonia aquifolium</i> (Pursh) / 1	Grigaliūnaitė, 1997
<i>Podosphaera tridactyla</i> (Wallr.) de Bary**	<i>Padus avium</i> Mill. / 3	Grigaliūnaitė, 1997
<i>Podosphaera physocarpi</i> (U. Braun) U. Braun, (= <i>P. aphanis</i> var. <i>physocarpi</i>) **	<i>Physocarpus opulifolius</i> (L.) Maxim. / 105	Lubell et al., 2011
<i>Erysiphe clandestina</i> Biv (= <i>E. populi</i> , <i>Microsphaera populi</i> , <i>Uncinula clandestina</i>) *	<i>Populus tremula</i> L. / 18	Brundza, 1934; Grigaliūnaitė, 1997
<i>Sphaerotheca macularis</i> f. <i>potentillae</i> Jacz.*	<i>Potentilla fruticosa</i> L. / 31	Brundza, 1934
<i>Podosphaera tridactyla</i> (Wallr.) de Bary *	<i>Prunus cerasifera</i> Ehrh. / 16	Grigaliūnaitė, 1997
<i>Erysiphe azaleae</i> (U. Braun) U. Braun & S. Takam. (= <i>Microsphaera azaleae</i>) **	<i>Rhododendron</i> sp. / 7	Kazlauskaitė, 2012
<i>Erysiphe trifolii</i> Grev. *	<i>Robinia pseudoacacia</i> L. / 14	Grigaliūnaitė, 1997
<i>Podosphaera pannosa</i> (Wallr.) de Bary (= <i>Sphaerotheca pannosa</i>) **	<i>Rosa rugosa</i> Thunb. / 84	Grigaliūnaitė, 1997
<i>Uncinula salicis</i> f. <i>salicis</i> (DC.) G. Winter ***	<i>Salix alba</i> Tristis / 15	Grigaliūnaitė, 1997
<i>Erysiphe adunca</i> (Wallr.) Fr. (= <i>Podosphaera schlechtendalii</i> , <i>Uncinula salicis</i> , <i>U. adunca</i>)*	<i>S. caprea</i> L. / 46	Brundza, 1927, 1934; Grigaliūnaitė, 1997
<i>Erysiphe vanbruntiana</i> (W.R. Gerard) U. Braun & S. Takam. (= <i>Microsphaera vanbruntiana</i>) ****	<i>Sambucus nigra</i> L. / 2	Grigaliūnaitė, 1997

Powdery mildew fungi species, distribution in Lithuania	Observe Host plants, / Number of plants	References
<i>Podosphaera clandestina</i> (Wallr.) Lév. (<i>P. Oxyacanthae</i> , <i>P. aucupariae</i>) **	<i>Sorbus aucuparia</i> L. / 22	Brundza, 1934; Grigaliūnaitė, 1997
<i>Erysiphe clandestina</i> Biv. (<i>Uncinula clandestina</i>) ***	<i>Ulmus glabra</i> Huds /16r	Grigaliūnaitė, 1997
<i>Erysiphe clandestina</i> Biv. (= <i>Uncinula clandestina</i>) *	<i>U. laevis</i> Pall. / 8	Grigaliūnaitė, 1997
<i>Erysiphe kenjiana</i> (Homma) U. Braun & S. Takam.	<i>U. minor</i> Mill. /1	Heluta et al., 2009
<i>Erysiphe hedwigii</i> (Lév.) U. Braun & S. Takam. (= <i>Microsphaera hedwigii</i> , <i>M. pennicilata</i>) ***	<i>Viburnum opulus</i> L. /14	Brundza, 1934; Grigaliūnaitė, 1997

these plants at city plantations to be injured annually, particularly those grown in shades. Referring to literature data *Erysiphe euonymi* DC. (= *Microsphaera euonymi*, *Trichocladia euonymi*) is very common, spread from the top downwards or from the middle of the stem upwards on *Euonymus europaea* L. (Brundza, 1927). During the observation period only in 2013 at Jaunimo park this powdery mildew injured *Euonymus europaea* by 1.5 grades. Invasive species *Erysiphe flexuosa* (Peck) U. Braun & S. Takam. for the first time in Lithuania were described in 2002 (Grigaliūnaitė et al, 2004). They injure *Aesculus hippocastanum* L. every year, more strongly – lush, highly trimmed trees (Snieskiene et al., 2011). During the investigation period the variety ‚Purpurescens‘ (24 trees at Gulbynės, Jaunimo, Kurorto parks and Miesto sodo) of *A. hippocastanum* had no damage to be done.

Various mildew agents at recreational and protective street green plantations injured 15 genus, 19 species and 3 varieties of plants in total (Table 1). According to the data of the literature *Spirea japonica* L. variety ‚Macrophylla‘ (43 shrubs), *Alnus glutinosa* (L.) Gaertn. (101 trees) grown at urban green plantations under Lithuanian weather conditions could be injured by powdery mildew. The list of these plants and probable injury grade is presented at the Table 2.

One of the main functions of greeneries at the cities – decorativeness. Only healthy, well growing plants provide beauty. Constant monitoring of the phytopathological state of

plants is a relevant work selecting saplings to plant and maintaining growing old ones. Plants of new species originated from other counties are often imported with their harmful organisms, which can infest not only these plants but also those belonging to local flora.

CONCLUSIONS

1. During the monitoring at 2009–2016 on city green plantations and woody plants belonging to 35 genus, 48 species, 11 varieties, there were established 15 genus, 19 species and 3 varieties of plants to be injured by 4 genus and 10 species of powdery mildew agents. The largest diversity was of *Erysiphe* genus fungi (6 species): *Erysiphe alphitoides* (host plants *Quercus robur*), *E. berberidis* (*Berberis thunbergii* ‚Purpurea‘), *E. euonymi* (*Euonymus europaea*), *E. flexuosa* (*Aesculus hippocastanum*), *E. penicillata* (*Spirea arguta*, *S. latifolia*), *E. syringae* (*Syringa vulgaris*).

2. There were detected powdery mildew agents of 3 genus, 5 species on plants of 5 genus, 6 species and 1 variety grown at protected green plantations and on plants of 8 genus, 13 species and 2 varieties grown at recreational plantations were detected fungi of 3 genus, 9 species.

3. Plants at the recreational green plantations that suffered the strongest injuries: *Quercus robur* (powdery mildew agent *Erysiphe alphitoides*, average damage grade – from 1.4±1.58 till 4±1.12), *Acer ginnala* (injured by *Sawadaea bicornis*, from 1.08±0.23 till 3.33±0.14).

4. The species *Phyllactinia fraxini*, rare in

Lithuania, was detected on *Fraxinus exelsior* L., grown in streets

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