SHORT COMMUNICATION

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ERYSIPHE FLEXUOSA – THE NEW PATHOGEN OF AESCULUS HIPPOCASTANUM IN LITHUANIA

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Introduction of plant species results in migration of pathogenic microorganisms, which in big part manage to adapt to environmental conditions in new regions and spread quickly. The spread of new pathogen species can be prompt and threat local flora, so that they may be considered invasive species. For a long time invasive fungi have not been considered dangerous organisms (Palm 2001, Rossman 2001) and their spread and threat to new ecosystems have not been studied. Yet, the epidemic spread of Ophiostoma novo-ulmi, Gymnosporangium sabinae or Monilia laxa were described in many countries (Raudonis et al. 2008). In recent years the interest in invasive species, including fungi, is growing (Carlton 1999, Biological... 2004).

Erysiphales are obligatory parasites causing powdery mildew on plants from 169 families (Hirata 1986). Some species of Erysiphales are known to cause epidemics on cultivated plants: grape powdery mildew, spread in Europe in 19th century and American gooseberry mildew, spread in Europe and Asia in 20th century (Weltzien 1978). Their causing agents, Erysiphe necator and Podosphaera mors-uvae (synonim of Sphaerotheca mors-uvae), respectively, have features typical of invasive species.

Milevoj 2004). Among Lithuanian neighbour countries the horse chestnut mildew was first registered in Poland in 2000 (Adamska 2002).

The pathogen was first described as *Uncinula flexuosa* but after genetic examination was classified to *Erysiphe* genus (Braun and Takamatsu 2000). The fungus has greyish white mycelium. Ascomata are abundant, on the lower leaf surfaces, $80 \times 128$ μm. Asci 6–10 per ascoma, are ellipsoidal, with a short stalk, $33–51 \times 27–33$ μm, whereas ascospores ellipsoid-ovoid (according to Butin and Kehr 2002). It affects *Aesculus hippocastanum* by decreasing leaf assimilation, covering the surface and contributing to water loss, thus affecting photosynthesis and transpiration, as well as plant ornamental value.

*Aesculus hippocastanum* was introduced to Lithuania several hundred years ago and neither diseases nor pests have threatened the species seriously. The state of green plantations of Lithuanian cities have been observed and investigated for years and from 1994 on the status of horse chestnut is being assessed in all of the biggest cities of the country (Vilnius, Kaunas, Panevezys, Siauliai, Klaipėda, Marijampolė). The health status of horse chestnut is being deteriorating from 2004–2006, when chestnut powdery mildew and horse chestnut leaf miner have spread in the country. In July 2004 the new horse chestnut disease – powdery mildew was established in Kaunas, whereas in October the disease was discovered in Siauliai and in September – in Vilnius (Grigaliūnaitė et al. 2005).

The degree of tree damage was estimated according to the method set by Žiogas et al. (2007) and adapted to our work. The categories of tree condition were estimated with a 5-degree scale. After tree condition assessment, the average damage degree was estimated, with a modified method applied in forestry (Žiogas et al. 2007) according to the formula:

$$V = \frac{\sum (n \cdot b)}{N}$$

where:
- $V$ – average damage degree,
- $n$ – number of plants damaged to the same degree,
- $b$ – the degree of damage,
- $N$ – number of plants investigated.

Since 2004, when the powdery mildew first appeared in Kaunas, Vilnius and Siauliai the degree of tree infestation stays constant – the degree of damage ca 1–1.5 (Fig. 1), while the damage caused by the leaf miner is increasing on the whole territory of Lithuania – from the degree of damage below 0.5 in 2005 to almost 4 in 2008 and 2009 (Fig. 1).

During 2008–2009, chestnut powdery mildew was detected all over the territory of Lithuania, in areas where horse chestnuts were grown: in cities, towns, settlements and villages, and road sides (Snieškienė and Stankevičienė 2009). It was noticed that *A. hippocastanum* trees growing nearby, under the same conditions, were not equally resistant to *E. flexuosa*. A question arises whether this is influenced by individual morphological (thickness of leaf covering tissue, etc.) or other (biochemical) tree features. Trees growing under more favourable conditions, also
luxuriant trees as well as pruned, which produced larger sprouts, were noticed to be more injured by the pathogen.

From 2005 on, when massive spread of horse chestnut leaf miner began in Lithuania, the two invasive organisms (*E. flexuosa* and *Cameraria ohridella*) occur together on horse chestnuts (Fig. 1). Leaf blotch disease, which used to spread a few years ago (agent *Guignardia aesculi*), is rarely detected now. In Germany investigations are carried out on the co-infection of *G. aesculi* and *E. flexuosa* together with *C. ohridella*: the impact of these organisms on each other and the response of horse chestnut to them are being explored (Johne et al. 2006, 2008), yet, the interaction among the host-plant, the insect and fungi is not yet detected.

Considering the fact that the spread of powdery mildew agents as well as other invasive pathogens can be possibly related with climatic changes (Glawe 2008), further investigation on the *E. flexuosa* spread in new areas and on new cultivars and species of horse chestnut is required.

![Fig. 1. The spread of powdery mildew and leaf miner (average degree of damage) on horse chestnut in Lithuania in 2003–2009](image-url)
Streszczenie

ERYSIPHE FLEXUOSA – NOWY PATOGEN
AESCULUS HIPPOCASTANUM NA LITWIE


Literature

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