

FUNGI ON *AESCULUS* GENUS PLANTS IN VILNIUS CITY GREEN PLANTATIONS

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The phytosanitary state of green plantations was estimated in Vilnius city in 2005–2008. 24 fungal taxa were identified on *Aesculus hippocastanum*. Dangerous and frequent fungi infecting bark, trunk, twigs and leaves of *A. hippocastanum* in green plantations of cities were: *Diplodina aesculi*, *Erysiphe flexuosa* (*Uncinula flexuosa*), *Ganoderma applanatum*, *Nectria cinnabarina* as well as fungi of *Fusarium*, *Phellinus* genera. Dangerous new fungi, infecting twigs of *Aesculus x carnea* were *Phomopsis* spp.

Key words: *Aesculus*, fungi, Vilnius city, Lithuania

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INTRODUCTION

Information about fungi in Lithuania has been published already on the turn of the 18th century. Special investigations on fungi were started in 1923–1927, when first phytopathological laboratories were established in Kaunas, Dotnuva and Vilnius. Data on fungal diversity on *Aesculus* were scarce. Vilkaitis (1927) mentioned only one active destructor *Laetiporus sulphureus* on live and dead horse chestnut (*Aesculus hippocastanum*).

Forest mycology and phytopathology literature for a long time comprised only a book „Grybinės medžių ir krūmų ligos“ (Fungal diseases of trees and shrubs; 1950) published by A. Minkevičius. In the book 35 species of *Aphylliphorales* were mentioned. All available material concerning Lithuanian polypores was generalized by Gričius, Matelis (1996). In different habitats 155 species

of *Basidiomycetes* belonging to 4 families are described. Systematic investigations of *Melanconiales* fungi have been started in 1970 at the Institute of Botany (Vilnius). 143 species of *Melanconiales* on 160 host plant species, among them three – *Diplodina aesculi*, *Discula umbrinella*, *Steganosporium pyriforme* – on *Aesculus hippocastanum* are described (Ignatavičiūtė, Treigienė, 1998).

In 2002-2003 the diversity of various fungal groups has been investigated on deciduous plants in Lithuanian cities (Grigaliūnaitė, Matelis, Stakvilevičienė, 2005). Nine pathogenic fungi are described. In urban areas *Aesculus* plants are infected by different disease agents. The most dangerous fungi are *Erysiphe flexuosa*, *Ganoderma applanatum*, *Nectria cinnabarina* and fungi of *Fusarium*, *Phellinus* genera. The *Aesculus* powdery mildew *Erysiphe flexuosa* (*Erysiphales*) has undoubtedly been introduced

from North America and is a new disease for Europe (Ale-Agha et al., 2000). The causal agent of this disease was identified as *Erysiphe flexuosa* (Peck) U. Braun et S. Takamatsu, previously known as *Uncinula flexuosa* Peck and *Uncinuliella flexuosa* (Peck) U. Braun (Braun et al., 2003). The placement of *Uncinula flexuosa* into *Erysiphe emend* followed the new generic taxonomy of the *Erysiphales*, based on a reconsideration of anamorphic and teleomorphic features in comparison with molecular data (Braun & Takamatsu 2000; Braun et al., 2002). *Erysiphe flexuosa* is native and widespread in North America, Canada and USA on *Aesculus x carnea* Hayne, *A. glabra* Willd., *A. hippocastanum* L., *A. octandra* Marsh., *A. pavia* L. (Amano, 1986). Now this powdery mildew is known in Europe from Germany (Ale-Agha et al., 2000), Switzerland (Bolay, 2000), Great Britain (Ing & Spooner, 2002), Austria, France, Poland, Slovakia, Croatia (Zimmermanova-Pastirčakova et al., 2002), Hungary (Kiss, 2004).

Distribution of fungal disease agents on plants in green plantations mostly depends on meteorological conditions and anthropogenic activity.

The purpose of the present study was to collect and analyze the micro- and macro-fungi, causing diseases of *Aesculus* genus plants in urban green plantations.

MATERIAL AND METHODS

Material was collected in 2005–2008 during the field trips in Vilnius city and district. Samples were collected from dead and living twigs, branches, trunks. Specimens were analyzed in the Laboratory of Phytopathogenic Microorganisms of the Institute of Botany. A nutrient medium – malt extract agar (MEA), with pH 6.8–7.5 in Petri dishes was used for the isolation of fungi. The dishes were incubated in the thermostat at a temperature of 22 °C till appearance of fungal mycelium, spores (about 30 days). Fungal species were identified using

routine mycological methods. In order to identify specimens, microslices of the collected material were observed in distilled water. Fungal species were identified according to Ellis (1997); Eriksson (2006 a); Eriksson (2006 b); Farr (2007); Gricius, Matelis (1997); Ignatavičiūtė, Treigienė (1998); Watanabe (2002); Index Fungorum.

RESULTS AND DISCUSSION

Plants of *Aesculus* genus: *A. carnea* Hayne, *A. flava* Sol., *A. glabra* Willd., *A. pavia* L., grow in botanical gardens, homesteads, popular parks, *A. hippocastanum* L., *Aesculus x carnea* Hayne – in green plantation in Lithuania. In city green plantations horse-chestnut (*A. hippocastanum*) are frequent, while red horse-chestnut (*Aesculus x carnea*) are infrequently cultivated. Horse-chestnuts grow in public parks, by the street borders, in green grass street in the city and, together with other trees, play significant role in green plantations. *Aesculus* plants are especially sensitive to biotic and abiotic factors. Horse-chestnut dislike blacktop, sidewalk. Injured plants loose resistance to pathogenic fungi.

List of species of fungi on *Aesculus hippocastanum* in Vilnius city green plantation

Basidiomycetes Whittaker, 1959

Bjerkandera adusta (Willdenow) P. Karsten, 1879 – on stump in 1 locality.

Cerrena unicolor (Bulliard) Murrill, 1903 – on trunk in 1 locality.

Climacodon septentrionalis (Fries) P. Karsten, 1881 – on trunk in 1 locality.

Fomitopsis pinicola (Swartz) P. Karsten, 1881 – on trunk in 2 localities.

Fistulina hepatica (Schaeffer) Withering, 1792 – on trunk in 1 locality.

Ganoderma applanatum (Persoon) Patouillard, 1887 (syn. *G. lipsiense* (Batsch) G.F. Atkinson, 1908), – on trunk and root neck in 4 localities.

Hypochnicium bombycinum (Sommerf.) J .Erikss., 1958 – on root neck in 1 locality.

***Laetiporus sulphureus* (Bulliard) Murrill, 1920** – on trunk in 2 localities.

***Oxyporus populinus* (Schumacher) Donk, 1933** – on trunk and twigs in 3 localities.

***Phellinus robustus* (P. Karsten) Bourdot & Galzin, 1928** – on trunk in 1 locality.

***Ph. igniarius* (Linnaeus) Quélet, 1886** – on trunk in 1 locality.

***Polyporus squamosus* (Hudson) Fries, 1821** – on trunk in 2 localities.

***Schizophyllum commune* Fries, 1815** – on trunk in 3 localities.

***Stereum gausapatum* (Fries) Fries, 1874** – on tumble trunk in 1 locality.

***Trametes hirsuta* (Wulfen) Lloyd, 1924** – on trunk in 1 locality.

***Pyrenomycetes* Fries, 1849**

***Nectria cinnabarina* (Tode) Fries, 1849** (anamorph *Tubercularia vulgaris* Tode, 1790) – on trunk, twigs in 3 localities.

***Ascomycetes* Whittaker, 1959**

***Erysiphe flexuosa* (Peck) U. Braun & S. Takamatsu, 2000** (syn. *Uncinula flexuosa* Peck, 1872) – on leaves, wide distribution.

***Coelomycetes* Grove, 1935**

***Apiognomonina errabunda* (Roberge) Höhnelt, 1918** (syn. *Discula umbrinella* (Berkeley & Broome) M. Morelet, 1973) – on leaves, common.

***Diplodina aesculi* (Saccardo) B. Sutton, 1980** – on leaves, common.

***Phomopsis* spp.** – on withered, dead twigs, trunk of *Aesculus x carnea*, in 1 locality.

***Gaiguardia aesculi* (Peck) V.B. Stewart, 1916** (syn. *Phyllosticta sphaeropsoidea* Ellis & Everhart, 1883) – on leaves in 3 localities.

***Septoria aesculi* (Libert) Westendorp, 1851** – on leaves in 1 locality.

***Septoria aesculicola* (Fries) Saccardo, 1890** – on leaves in 1 locality.

***Hyphomycetes* Fries, 1821**

***Fusarium oxysporum* Schlechtendal, 1824** – on twigs in 3 localities.

***Fusarium sambucinum* Fuckel, 1870** (syn. *Gibberella pulicaris* (Fries) Saccardo, 1877) – on twigs in 3 localities.

24 fungal taxa were identified on *Aesculus hippocastanum*, one on *Aesculus x carnea*. Dangerous new fungi, infecting leaves of *A. hippocastanum* are *Erysiphe flexuosa* (*Uncinula flexuosa*), and bark, trunk, twigs of *Aesculus x carnea* – *Phomopsis* spp. In green plantations of cities these fungi were reported for the first time from Lithuania.

First record of powdery mildew *Erysiphe flexuosa* (Peck.) U. Braun et S. Takamatsu from Lithuania was registered in September 2004. Powdery mildew is covered with white mold. This symptom was observed on leaves of horse-chestnuts (*Aesculus hippocastanum*) growing in Vilnius and Šiauliai (Vilnius, September 15, October 22, 2004; Šiauliai, September 21, 2004). The fruitbodies in the winter stage of the fungus appear as small black dots over the mold in September and October. Fungal colonies appeared and spread on upper and lower leaf surfaces of young as well as old leaves. The fungus was recently found throughout the country.

Phomopsis spp. (Sacc.) Bubak – cancer twig blights. *Phomopsis* cankers localized diseases, particularly of woody plants. They result in a shrinking and dying of the tissues, which later crack open and expose the wood underneath. *Phomopsis* spp. were found on 7 year-old twigs of *Aesculus x carnea* during all seasons in 2005. Conspicuous symptoms are the wilting, yellowing and falling of the leaves of infected red horse-chestnut, and frequently the falling of flower buds before opening. Later the branches turn brown. In spring conidia oozing out of a pycnidium in a tendril-like mass. Both types of alpha and beta conidia have been registered in June. After 2006 frost, the injured red horse-chestnut was cut away.

Tree decay, mainly caused by *Basidiomycetes* fungi, was the most potential cause for trunk breakage on *Aesculus hippocastanum*. In addition, advanced decay caused by *Nectria cinnabarina* was the most important reason for decreased safety of *Aesculus* trees. This fungus dominates in urban green plantations.

Symptoms of the *Fusarium* disease are striking. *Aesculus hippocastanum* leave margins turn brown in June. In mid-summer, the leave browning progresses inward between the veins. Eventually the entire leaf turns brown, wilts and falls down from the twig. Later all injured branches dye.

A leaf spot disease (*Apiognomonina errabunda*, *Guignardia aesculi*, *Septoria aesculi*, *S. aesculicola*) causes small brown circular spots on the leaves.

In 2007–2008 *Cameraria ohridella* Deschka & Dimic, 1986 was the most important pest of the horse-chestnut in Lithuania. Horse-chestnut leaf miner *Cameraria ohridella* was first observed in Nida near the Baltic Sea in 2002. The moth has spread very rapidly and it is now present across most of the country.

In June 2008 in Vilnius city *Cameraria ohridella* damaged 50 % of *Aesculus hippocastanum* leaves; in August – 100 % of leaves. The leaves die and drop off. The fungi, disturbing horse-chestnut leaves – *Erysiphe flexuosa*, *Guignardia aesculi*, *Diplodina aesculi* – were infrequently recorded.

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