FIRST REPORT OF *CRYPTOSTROMA CORTICALE* (ELLIS & EVERH.) P.H. GREG. & S. WALLER ON *ACER PLATANOIDES* L. IN BULGARIA

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Abstract

Sooty bark disease caused by the fungus *Cryptostroma corticale* (Ellis & Everh.) (Greg. & S. Waller) was recorded for first time in Bulgaria during the autumn in 2014. The symptoms of disease were found on stems of Norway maple (*Acer platanoides* L.) planted as an ornamental tree in parks and gardens in Sofia.

Key words: *Cryptostroma corticale*, *Acer platanoides,* sooty bark disease.

First description of the anamorphic fungus *Cryptostroma corticale* (Ellis & Everh.) P.H. Greg. & S. Waller was made by Ellis and Everhart in 1899, who isolated it from a maple log (*Acer campestre* L.) in North America. In UK it was first detected in 1945 in a park in Essex, where the fungus had caused significant damage to maple population. The disease has also been reported in France on *Acer platanoides* L. as well as in USA and Canada on *A. campestre* L. and *A. negundo* L. (Abbey, 1978).

More reports of the sooty bark disease of *A. pseudoplatanus,* caused by *C. corticale* appeared in several European countries in the beginning of XXI century. It was notified mainly in urban areas and parks. In 2005 six hundred trees were cut and burned in Paris mostly in Bois de Boulogne. There are no reports of the disease being identified in mixed forests (Douzon, 2007). It was recorded in Germany in 2003 and 2006. In 2004 it was observed in one location near Vienna and was found on several *A. pseudoplatanus* trees in 2003 in Ticino as well as around Geneva Lake (EPPO Global Database). The first finding of *C. corticale* in the Netherlands was reported in 2014 on firewood of *A. pseudoplatanus* (NPPO, 2014).

In the last decade, severe drought conditions during summer resulted in an outbreak of sooty bark disease in park areas in Prague. First symptoms were wilting and branch dieback that appeared several months after the disease outbreak. The fungus form dark brown stromata below the bark which at a later stage break off the bark exposing a sooty layer of spores. Based on molecular data obtained in the course of investigation of this attack, Koukol et al. (2014) concluded that *C. corticale* must be treated as a member of Hypoxyloideae clade of Xylariaceae.

This is first record of fungus *C. corticale* as a new species for Bulgaria. In August 2014, in the park area near the lake in Druzhba residential quarter (Sofia), black stromata were noticed on stems of several Norway maple trees (Fig. 1A, B).

In November, the park trees were observed again and it was indicated dissemination of infection and symptoms were found on most of tree trunks (Fig. 1C). In early December the same symptoms were found on several trees in a garden in Mladost residential quarter (Fig. 1D). Samples from infected trees were taken and their investigation showed that the causer of the disease was the sac fungus *C. corticale* (Fig. 1E). Measured conidia (Fig. 1F) had an average length of 6.5 μm (5.4-8.1 μm) and width of 3.5 μm (2.7-4.1 μm). These dimensions were not significantly different from ones mentioned by Lohrer (2010): 5-12×3.5-4 μm and Abbey (1978): 4-6×2.5-4.5 μm.

C. corticale occurs asymptomatically in the sapwood of healthy trees and activates by moisture stress (Lonsdale et al., 2003). The record high temperatures in the summer of 2003 cause several cases of sooty bark disease on sycamore trees in UK. In a 3.5 ha stand in Northamptonshire 40% of the trees died after an infection with *C. corticale* (Thorpe et al., 2006). Periods of severe outbreaks are often preceded by an extremely hot summer or a series of consecutive years with hot summers (Douzon, 2007). Most sensitive to the disease are trees exposed to prolonged water stress or damaged by other factors (storms, worsened soil conditions).

In 2009 in Bulgaria began a series of consecutive years with favourable conditions for attack by *C. corticale*. In the extremely dry year of 2011 the quantity of measured rainfall was significantly less than normal. In 2012 the amount of precipitation was close to the average annual but extremely high air temperatures (up to 37.5^{o} C) were recorded during the summer months. In the next year (2013) the summer was also dry and hot. During these three consecutive years, heavy rainfalls occurred only in one month of the year. After this prolonged dry period, in 2014 the precipitations increased significantly and were over twice the average value for the last 20 years (Stringmeteo, 2014). Apparently the drought and subsequent humidity stress had activated the fungal infections on Norway maple trees in parks in Sofia.

In advanced stages of the disease, sporulated layer is well developed under the thin outer crust. Cutting of trees in this stage provides the release of billions of spores, making control difficult. It is recommended the infected trees to be cut down during winter, while sporulation is minimal.

Personal protective measures (workwear and mask) should be taken during the felling process (Douzon, 2007) because plant disease caused by *C. corticale* is dangerous to humans. Inhalation of large amounts of fungal spores causes severe breathing difficulties and lung allergy to some people.

So far, sooty bark disease has been sporadic and limited in distribution in Bulgaria. The role of environmental factors (like drought periods alternating with high precipitation during the vegetation period, etc.) might induce stress reactions in the host plants which may favour the spread of *C. corticale* (Krabel et al., 2013). Future monitoring of damages caused by this aggressive pathogen in Bulgaria is needed.

Fig. 1. Black stromata on stems of Norway maple trees (A, B) in the park near the lake in Druzhba (C) and in a garden in Mladost (D). Stroma (E) and conidia (F) under microscope.

REFERENCES

Abbey, S. D. 1978. The morphology and physiology of *Cryptostroma corticale*. PhD Theses (Chemistry). 229, URL: https://dspace.lboro.ac.uk/2134/12538.

Cech, T. L. 2004. Bemerkenswerte Krankheiten in 2004. Forstschutz. Aktuell. 32, 31–34.

Douzon, G. 2007. La suie de l'érable : un bon indicateur d'été chaud. Bilan de la santé des forêts en 2006. Département de la santé des forêts, 2.

EPPO Global Database. 2015. URL: https://gd.eppo.int/taxon/CRPSCO.

Ellis, J. B., B. M. Everhart. 1889. New Species of Hyphomycetous Fungi. J. Mycol. 5, 68–72.

Index Fungorum Home Page. 2014. http://www.indexfungorum.org/.

Koukol, O., I. Kelnarová, K. Černý. 2014. Recent observations of sooty bark disease of sycamore maple in Prague (Czech Republic) and the phylogenetic placement of *Cryptostroma corticale*. Forest Pathology. DOI: 10.1111/efp.12129.

Krabel, D., Morgenstern, K., Herzog, S. 2013. Endophytes in changing environments – do we need new concepts in forest management? iForest – Biogeosciences and Forestry, Short Communication, doi: 10.3832/ifor0932-006.

Lohrer, Th. 2010. Rußrindenkrankheit am Ahorn. ARBOFUX - Diagnosedatenbank für Gehölze. URL: www.arbofux.de/russrindenkrankheit-am-ahorn.html.

Lonsdale, D., G. A. MacAskill, D. R. Rose, C. Tilbury, K. V. Thorpe. 2003. The Health of Non-Woodland Amenity Trees in England during 1999 and 2000 (PDF-2215K). Arboriculture and Research Information Note. The Tree Advice Trust.

Metzler, B. 2006. *Cryptostroma corticale* an Bergahorn nach dem Trockenjahr 2003. Mitt. Biol. Bundesanst. Land- Forstwirtsch., Berl.-Dahl.400, 161–162.

NPPO. 2014. First finding of *Cryptostroma corticale* (fungus) in firewood of *Acer pseudoplatanus*. National Plant Protection Organization, Wageningen, The Netherlands. URL: www.nvwa.nl/onderwerpen/english/dossier/pest-reporting/pest-reports.

Stringmeteo. 2014. URL: http://www.stringmeteo.com/.

Thorpe, K. V., J. Poole, D. R. Rose, J. Rose, N. Straw, C. Tilbury. 2004. The Health of Non-Woodland Trees in England in 2004 (PDF-782K). Arboriculture and Research Information Note. The Tree Advice Trust.

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