

Dutch elm disease in Turkey

Funda Oskay^{1,*}, Asko Lehtijärvi², A. Gulden Aday Kaya³, İlker Kurbetli⁴, Mehmet Aydoğdu⁴, Tugba Doğmuş Lehtijärvi⁵, Steve Woodward⁶

¹ Çankırı Karatekin University, Faculty of Forestry, 18200, Çankırı, Turkey

² Bursa Technical University, Faculty of Forestry, 16310 Yıldırım/BURSA, Turkey Batı Akdeniz

³ Süleyman Demirel University, Yenişarbademli Vocational School, Yenişarbademli Isparta, Turkey

⁴ Agricultural Research Institute, Plant Health Department, 07025 Antalya, Turkey

⁵ Süleyman Demirel University, Faculty of Forestry, 32600, Isparta, Turkey

⁶ University of Aberdeen, Institute of Biological and Environmental Sciences, Department of Plant and Soil Science, Cruickshank Building, Aberdeen AB24 3UU, Scotland, UK.

* Corresponding author: fuskay@gmail.com

Abstract: Dutch elm disease (DED) is arguably the most destructive disease of broadleaf trees, killing the majority of elms (*Ulmus* spp.) in Europe and North America over the last 100 years. The first disease outbreaks were caused by *Ophiostoma ulmi* around 1910s in northern France, Belgium and Holland, but the pathogen spread to the whole Europe, to Turkey to Asia and also to North America. By the 1940s, it is likely that a second DED pathogen, *O. novo-ulmi*, which was more aggressive than *O. ulmi*, was introduced into North America, causing almost 100% mortality in mature elm. *O. novo-ulmi* now is divided into two subspecies, ssp. *novo-ulmi* and ssp. *americana*, based on the original regions of discovery. Subspecies *novo-ulmi* was first described from Moldova–Ukraine in Eastern Europe and subsequently spread throughout Europe and parts of Asia, whereas ssp. *americana* spread from central North America into Europe. Today, both subspecies occur in Europe; where their distributions overlap, hybrids are produced. DED was first detected in Turkey in the 1940s; however, the causal agent was not characterized. In early 1980s, a survey of DED distribution was carried out over most of Turkey by S. Sümer. However, the causal agents were not determined in the survey too. While some local studies addressed the disease and the causal agents in the early 2000s, more detailed information on the *Ophiostoma* species and their subspecies as well as their mating types were obtained in a number of global studies carried out by European researchers between 2001 and 2010. The current distribution of DED and the causal agents as well as their host species in Turkey however, are still not clear. The disease caused massive losses of elms populations in many regions of Turkey, including both forests and urban environments, but the overall ecological impact of these losses also remains unknown. The aim of the work reported here was to investigate the current distribution of the *Ophiostoma* species and subspecies causing Dutch elm disease in Turkey. For this purpose, survey work throughout the country has been initiated. To date, surveys have been conducted in southern, eastern and central Anatolia, particularly around Isparta, Burdur, Antalya, Uşak, Denizli, Aydın, Afyon and Çankırı. While our surveys are continuing, dead or dying trees with characteristic symptom and signs of DED were observed only in Burdur, Isparta and Çankırı so far. Characterization of the causal agents, determining their distribution and their impact on different elm species could provide beneficial information on the management possibilities and future challenges posed by the disease.

Keywords: *Ophiostoma ulmi*, *O. novo-ulmi*, *Ulmus glabra*, *Ulmus laevis*, Alien invasive forest pathogens