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Polypores, Agrobacterium and ivy Damage on Hungarian Trees

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Abstract

Ancient trees are important habitats confer vital ecological roles and function as cultural legacies. Old trees with large girth are keystone structures in various ecosystems. We aim to present which species amongst the greatest Hungarian trees (and some other phanerophyte plants) are damaged by polypores (the most important agents of wood decay), Agrobacterium tumefaciens (usually causing root tumour) or ivy (competing against the native vegetation and causing windthrow damage) and at what extent and frequency; and whether there is a relationship between these types of damage and the origin of the species (native or adventive) or its situation (solitary or surrounded by other trees). We measured 2,000 trees, belonging to 29 native and 43 non-native species. Polypore infection could be detected in 12.2%of the observed 531 settlements, 22.8% are damaged by Agrobacterium and 29.6% by ivy, while 51.2% by other types of pests and diseases. Altogether, one third of the observed 2000 ancient or veteran trees suffered from one or more types of damage. A total of 33.5% of the native species (519 specimens out of 1550) and 28.7% of the adventives (129 trees out of 450) are damaged by any (or more than one) of the mentioned infections or ivy. Mostly, damage occurred to those old trees that stand in a park or forest, while the single (solitary) trees were usually healthy. The most infected regions are the western and south-western counties, while the Northern Hungarian Mountain Range is much less affected, despite its great sample size. Low damage was detected in the Great Hungarian Plain, but the number of sample areas and veteran trees was also low here. The damage to old trees remains without any management or healing in Hungary, since the only effective solution would be prevention.

Keywords : Environmental history, notable tree, pest, plant protection, veteran tree, non-native

Introduction

Ancient trees have large girth and astonishing ecological value. The age when a tree can be considered ancient is species specific (Hartel and Plieninger 2014). They contain varied microhabitats, such as hollows or hollowing trunks or branches, cavities, wood mould, decaying wood in the crown, flaking bark which support exceptional numbers of specialized species including fungi, lichens, birds, small mammals and endangered species of wood-living insects (Ranius and Jansson 2000; Read 2000; Sverdrup-Thygeson et al. 2010; Bergman et al. 2012). This is why ancient tree-based systems are considered as global hotspots of biodiversity (Buse et al. 2010) and the old trees are keystone structures in natural, agricultural and urban ecosystems (Gibbons et al. 2008). Their great size and age provide ecological niches of value to specialized flora and fauna that cannot be provided by younger, smaller trees (Linden Mayer et al. 2014) and function as cultural-emotional legacies as well, linking the past to the present (Manning et al. 2006; Lonsdale 2013; Eriksson 2018). The preservation of landscapes, where there is still a high density of ancient trees, should be a priority for all European countries (Zapponi et al. 2017).

One of the reasons why we are so concerned about the ancient trees in Hungary is that we believe that they are of great importance when considering nature values and qualities in forests, agricultural landscapes, as well as cultural heritage and landscape features. This is why it is inevitable that we review their general data (girth, perimeter, height etc.), ethnographical and historical relations, health status and endangering factors to plan their active conservation. In Hungary, the first calls for the protection of ancient, giant trees date back to the early 20th century (e.g. Rapaics 1929). The respect towards them has led to the protection of several ancient trees, most of them within settlements (Tardy 1996). Their main data are registered in online databases (Pósfai Gy 2019, Monumental Trees 2019 and Hungarian Monumental Trees 2019). The greatest Hungarian database (Pósfai Gy 2019) started as a private website, but as a good example of citizen science, everyone can send new data; however, these will be uploaded only after validation (visited and measured on the spot) by the founder. Overviews on the cult of the oak genus and presentation of some remarkable Hungarian oak trees were provided by Szakonyi (2018), while in the case of lime species and sweet chestnut, see our previous articles (Takács and Malatinszky 2012; Takács et al. 2015). Iváncsics and Filepné (2019) provide explanations to visual tree assessment.

There are thousands of ancient trees in Hungary and they need special care and protection. However, most of them are situated in hidden areas, far from parks and gardens, thus, without any special attention being given to their health state, maintenance or care. Our aim is to present which specimens and species amongst the greatest Hungarian trees (and other phanerophyte plants, such as black elder and hawthorn species) are damaged by well-known pests and diseases, such as polypores, Agrobacterium or ivy and to what extent and frequency. As far as we know, there has been no similar research so far. Our study covers every Hungarian region, about 2,000 very old, sizeable trees, some of them being champions with the largest species-specific girth or height in the country.

Polypores are a group of basidiomycetes fungi that form fruiting bodies with pores or tubes on the underside. They inhabit tree trunks or branches consuming the wood and, thus, they are the most important agents of wood decay. Even though saproxylic fungi act as keystone species in forest ecosystems (Moose et al. 2019), sustaining, for example, beetle communities (Andrési and Tuba 2018), several polypore species are serious pathogens of plantation trees and are major causes of timber spoilage. The most common polypore in Hungary is the tinder fungus (Fomes foment Arius), a stem decay fungal plant pathogen of beech and other deciduous trees, such as birch, poplar, willow and oak species (Igmándy 1991). Its mycelium penetrates the wood of trees through damaged bark or broken branches, causing white rot in the host. It continues to live on trees long after they have died, changing from a parasite to a decomposer (Baum et al. 2003).

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