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URBAN FORESTS AS NATURE-BASED SOLUTIONS

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Management practices alter the endophytic mycobiota of an urban forest favouring pathogenic endophytes

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Abstract

Urban parks and forests have been demonstrated to play an important role in the general well-being of society, providing multiple ecosystem services. Trees help to clean the air, generate oxygen, provide shade, reduce the heat islands effect, improve the microclimate, and are visually important within the urban environment. In recent years, however, tree health in urban areas has been increasingly compromised by environmental stresses. Climate change has been shown to induce physiological impairment in trees, predisposing them to attack by various agents of damage. This study was conducted in the Parco Nord Milano (PNM), in the city of Milan, where many trees have exhibited extensive dieback and mortality during the past years. Park managers, in an attempt to halt or at least mitigate the decline of some forest stands, had started to thin out some plots, removing dead trees or trees in an advanced state of decline. The purpose of this silvicultural intervention was to reduce the density and therefore the competition among the trees. Furthermore, by making more resources (water, light, nutrients in the soil) available to the remaining trees, it was hoped that it would be possible to improve tree health and reduce the decline. Unfortunately, thinning exacerbated the suffering of trees and influenced in a negative way the species composition of the endophytic fungal community. In fact, thinning made trees more vulnerable to pathogen attacks (e.g. more prone to infection by leaf pathogens during the spore rain), and also induced a shift in the fungal endophytic assemblage, favouring massive colonisation by the more aggressive, thermotolerant, horizontally-transmitted fungal pathogens. This negative outcome was also a consequence of improperly conducted thinning operations, the damage caused by spreading infected material within park areas, and not properly cleaning pruning equipment.



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