

Monitoring of Latent Tree Mortality after Forest Fires: A Biosensor Approach

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Abstract : In Mediterranean countries, forest fires are recurrent events that need to be considered as a central component of regional and global forest management strategies and biodiversity restoration programmes. The response of tree function to fire damage can vary widely, also taking into account species, season, age of the tree, etc. Trees that survive fire may have different levels of physiological functionality, which may result in reduced growth or increased susceptibility to delayed mortality. An approach to assessing irreversible physiological injury in trees could help to inform management decisions at burned sites for biodiversity restoration, environmental safety and understanding of ecosystem functional adaptations. Physiological proxies for latent tree mortality, such as cambial cell death, reduced or absent starch and soluble sugar content in C sinks, and ethanol accumulation in the phloem, are considered proxies for cell death. However, their determination requires time-consuming laboratory protocols, making the approach unfeasible as a practical option in the field, but recent findings have shown that biosensors could be usefully applied to overcome these limitations. The study will focus on the development of amperometric biosensors capable of detecting a few target molecules in the phloem and xylem (such as ethanol and glucose) that have recently been identified as proxies for latent tree mortality. The results of a specific experiment on a stand of *Pinus pinaster* subjected to prescribed fire are reported.

Keywords : enzymes, glucose, ethanol, prescribed fires

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