

Crown defoliation and tree physiology: hints for a field assessment

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Crown defoliation is the key parameter to assessing the condition of trees in forest health monitoring, but it does not indicate *per se* a state of physiological stress. The impacts of environmental and biotic factors are reflected in the difference of defoliation between two subsequent years (Δdef) and processes leading to increased mortality. Ongoing climate change, with increasing frequency of drought and heat waves and other extreme events (such as late frost, storm wind and opportunistic parasite attacks), is a global factor that induces widespread defoliation, crown dieback and tree mortality. Studies (reviewed by Bussotti et al., 2024) evidenced that sudden defoliation events impair many physiological functions such as: photosynthesis at leaf and crown level, carbon (NSC, non-structural carbohydrates) transport and allocation, water status and balance and, finally, the whole growth of trees.

This presentation summarizes the main physiological processes occurring in defoliated trees and the pathways of possible recovery or mortality. We propose a set of physiological indicators to assess the conditions of trees subjected to extreme climatic events and parasitic attacks. The indicators proposed were already experienced in previous field surveys and are low cost, quick and easy to apply in forests. Moreover, they have large potential to describe the main eco-physiological processes occurring at tree and at plot level.

Finally, we present the ongoing initiative, within the Expert Panel of Crown Conditions, for the realization of common protocols for the application of such indicators in the ICP Forests plots.

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