Submitted Abstract

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Abstract

The steady growth of deer population recorded in the European forests during the last decades is causing browsing pressure on saplings to become increasingly heavy. The effects of this pressure have been studied mainly in terms of increased mortality of saplings of preferred forage species. However, still little is known about what drives selection of individual saplings within a given tree species, an issue with important implications for population genetics, forest stand structure and forestry management. Even less is known about the impact of browsing on tree architecture and, consequently on tree mechanical stability. In the first phase of a project aiming at highlighting the ecological implications of deer-sapling interaction in habitat undergoing natural disturbance and characterized by intense tree regeneration, we developed an index of browsing intensity, Bi, based on number of browsed shoots and their relative diameters per sapling, and an index of sapling vitality, Vi, based on sapling architectural parameters, and tested the correlation between the two for various tree species. The results of this first phase show no univocal pattern in the relationship between Bi and Vi, which strongly varied among different species, thus confirming that tree species identity remains the most important factor affecting browsing intensity. In the second phase, we analysed the impact of browsing, light intensity and their interaction on three architectural indices: sapling slenderness, crown slenderness and crown asymmetry. The relative importance of browsing and light on these traits was also assessed. Our results show that increasing Bi cause the saplings to become slenderer, their crowns more asymmetric and, in the case of the tall saplings, flatter, while light intensity makes saplings stouter and their crowns slenderer. Meanwhile, browsing significantly modifies the effect of light on sapling architecture, causing all tested architectural indices to decrease along with increasing light intensity. Based on these results and given the observed deer population increase we may expect to observe in the future an increasing, though slight, tendency of trees to develop asymmetric crowns and slenderer stems, which would result in a lower mechanical stability. Since extreme events such as windstorms are also expected to become more frequent and intense, browsing could ultimately expose trees to a higher risk of breakdown, with the consequent opening of forest stands and all the associated changes in understory conditions.