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The InduForestFire Project: questioning the current fuel management practices in Portugal and insights for developing fire-smart management strategies

[1]Oliveira, Aline, [1]Silva, Joaquim. S, [1]Pacheco, Miguel, [1]Neves, Ricardo and [2]Fernandes, Paulo

[1]*Polytechnic Institute of Coimbra, Coimbra Agriculture School, Bencanta, 3045-601 Coimbra, Portugal*
[2]*Centre for the Research and Technology of Agro-Environmental and Biological Sciences, CITAB, University of Trás-os-Montes and Alto Douro, Quinta dos Prados, 5000-801 Vila Real, Portugal*

Abstract

The InduForestFire project seeks mitigation solutions to avoid damage caused by large fires in industrial zones (IZs). In Portugal, the structure and composition of vegetation around IZs plays a strong influence on fire hazard around and inside the industrial perimeter. However, the existing knowledge in this regard is still insufficient for the development of efficient management strategies. Based on fire behaviour simulations and in situ data collection, the project has already achieved some important results to guide effective fuel management and more adequate prevention actions for Portugal. The first results indicate that the expansion of mega-fires, like those of 2017, can be locally interrupted by patches of broadleaved forest. We identified that using the broadleaved forest in the WUI areas of the IZs of the central region of Portugal can reduce the fire intensity up to five times. In this scenario, fires that exceed the suppression capacity in current pine and eucalypt forests (>4m flame length) can be effectively suppressed in broadleaf forests under extreme fire weather (1.4m flame length). We sampled 30 pairs of adjacent eucalyptus, maritime pine, and broadleaf stands in the same region to contrast these results and assess fire hazard. Our statistical models (GLM) demonstrate significant differences in the rate of spread and flame length between broadleaves vs pines and eucalyptus, and the last two did not show significant differences between them. Based on a multivariate analysis, we identified that the lower fire behaviour in broadleaves is associated with a higher canopy cover and higher 1h fuel moisture. We also evaluated the effect of fuel reduction on fire behaviour in fuel breaks, in different types of forests. For this, we sampled more 30 pairs of Managed Areas vs. Unmanaged Areas, in eucalyptus, maritime pine, and mixed stands. Our results showed a trade-off between the beneficial reduction in fuel load and fuel bed depth, which supposedly justified the management criteria, and the more severe weather conditions (higher wind speed and lower relative humidity) in managed areas. Only one statistical test (out of 12)

showed significant differences in fire behaviour between the three types of stands. From these results, the project corroborates the urgent need to discuss the efficiency and relevance of current forest management in Portugal, simply based on the reduction of surface and canopy fuels and which does not encourage, for example, the use of more resilient species in the territory.