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Microsite amelioration by post-fire deadwood in a Pinus nigra planted forest in central Italy

Flavio Taccaliti[1], Davide Marangon[1], Alessandro Vitali[2], Carlo Urbinati[2], Raffaella Marzano[3], and Emanuele Lingua[1]

[1]Università degli Studi di Padova, Dipartimento Territorio e Sistemi Agro Forestali, Legnaro (PD) 35020, Italy (flavio.taccaliti@unipd.it)
[2]Università Politecnica delle Marche, Dipartimento di Scienze Agrarie, Alimentari ed Ambientali, Via Brecce Bianche 10, Ancona 60131, Italy
[3]Università degli Studi di Torino, Dipartimento di Scienze Agrarie Forestali e Alimentari, Largo Braccini 2, Gruglaisco (TO) 10095, Italy

The widespread role of fire in shaping ecosystem composition and distribution, as well as its evolutionary importance, are nowadays fully recognized by scientists. In contemporary ecosystems, forest fires can induce different kinds of effects, depending on species characteristics, with the presence of fire-related traits often allowing full ecosystems recovery also after stand replacing or high severity events.
By modifying growing space conditions (e.g. exposed bare soil, reduced competition), forest fires may trigger ecological processes such as forest regeneration. In the absence of specific fire adaptations, biological legacies persisting after the event have been proven crucial to drive regeneration dynamics. Indeed, deadwood can create safe sites and favourable microsite conditions for seedling establishment and survival. Despite the potential increase in coarse dead fuel load resulting from post-disturbance deadwood, its removal (e.g. through salvage logging activities) can cause long lasting negative effects on the ecosystems and the services they provide, often delaying or altering forest recovery.
Studies are needed to assess the importance of facilitation mechanisms in different post-fire conditions, in order to provide suitable information on deadwood management and Assisted Natural Regeneration approaches to forest planners and managers.
In a xeric Pinus nigra planted forest in central Italy (Marche Region) affected by a large crown fire in 2017, soil temperature and moisture were measured in the topmost 5 cm of soil at various distances (n = 5) from downed logs (n = 14). Values were recorded in nine time steps during the summer of 2022.
A significative positive effect of downed logs on microsite conditions (lower summer temperature, higher soil moisture) was observed. Based on these first results, a long-term monitoring project has been set up to evaluate if regeneration has actually a better performance in the identified microsites. An extensive natural regeneration sampling was performed in the burnt area, and artificial regeneration, both from seeds and trasplanted seedlings, was placed at different positions around the deadwood, trying to mimic the patterns of natural regeneration.
The preliminary otuputs of this study will be integrated with other case studies and further field

sampling campaigns, but they suggest that post-fire deadwood can facilitate natural regeneration and should not be completely removed from burnt areas.