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Abstract

Fire as a germination cue: A review for the Mediterranean basin

Susana Paula, Carmela P. Cervelló, Juli G. Pausas

Fundación CEAM, Charles R. Darwin, 14 Parc Tecnològic, ES-46980, Paterna, València, Spain

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One plant strategy for persisting in fire-prone environments is to have propagules (seeds) that can survive a fire and germinate just after it. The increased post-fire germination may be due to the high resource availability and/or low competition after a fire, but it may also be explained by fire-stimulated germination (i.e., dormancy breakage). The heat, smoke, ashes, charred wood, charcoal and nitrogenous compounds released during plant combustion may act, individually or in combination, as a cue for post-fire seed germination. Experimental evidence is needed to determine the effect of fire on seed persistence and germination. Many researchers have carried out experiments that monitor germination after seed exposure to at least one of the above fire-related factors. Frequently, different intensities or doses of these treatments are applied. Herein we compile in a database the results of a literature search on all related experiments performed on Mediterranean basin species. Additional data, such as taxonomic descriptors, resprouting ability and life form, were also gathered when available.

We found a total of 69 published studies that include treatments on heat, ash, smoke, charcoal, charred wood or nitrogenous compounds and that present appropriate data for compilation in a database. Heat treatments constitute the bulk of the compilation, appearing in 78.5% of the records. Treatments with nitrogenous compounds, ashes and, more recently, smoke, are also present. The compiled data comprised more than 150 species of the Mediterranean basin, from 28 families, most of them woody dicots. Cistaceae, Fabaceae, Pinaceae and Ericaeae are the best represented families. Although the numbers of resprouters and non-resprouters included in the compilation are very similar, more heat treatments were carried out with non-resprouters than with resprouters. The temperature treatments tested ranged from 50 to 400 °C, but temperatures of 70–120 °C were the most common. The exposure time to heat ranged from 0.5 min to 10 days, with heat expositions of 3–10 min being the most common.

This compilation has allowed us to detect gaps and biases in the current knowledge on the effect of fire on seed germination. Biases are mainly related to taxonomy, plant habit, resprouting ability and type of treatment. Applications of this compilation to answer evolutionary questions on fire ecology are also discussed.

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E-mail addresses: spaula@ceam.es (S. Paula), carpecer@hotmail.com (C.P. Cervelló), juli@ceam.es (J.G. Pausas).