

Fire and predation shape postfire regeneration of *Pinus halepensis* populations.

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Abstract

Wildfires are a natural disturbance in many ecosystems. Consequently, plant species have acquired traits that allow them to persist in fire-prone environments. Aleppo pine (*Pinus halepensis*) is a common tree species in the Mediterranean region. Its post-fire regeneration depends on the degree of serotiny, that is, the number of cones that remain closed (no seed dispersal) for more than a year, and that they open during a fire. Due to the relevance of this serotinous species in a world with increasing fire activity, we focus on better understanding the factors that explain the variability in the postfire regeneration capacity. On one hand, we asked about the role of fire regimen on the age of maturity of populations. We found that short fire intervals select for precocity of serotinous cones, and this translates in larger canopy seed banks. On the other hand, we wondered how predation pressure by squirrels affects serotiny. Our results show that predation decreases serotiny levels of populations, and increases cone defenses against predation. Our results also indicate that, within a population, these cone defenses modulate predation, and ultimately, the serotiny degree of the trees. These findings contribute to explaining the postfire regeneration potential in this pine species, which is very relevant in the context of change in fire regimes happening in the Mediterranean basin. These results also have direct management implications; selecting seeds from populations with high fire activity and low predation pressure for restoration projects would increase the resilience capacity of the restored woodland to face novel fire regimes with increased fire frequency.

Keywords: maturity age, serotiny, fire ecology, fire regime changes, seed predation

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