

Abstract

## The competition effects of understory on *Pinus pinaster* natural regeneration after wildfire

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The aim of this study was to analyse the interspecific competition effects of the woody understory vegetation on the regeneration of *Pinus pinaster*. The study area is located in a *Pinus pinaster* stand in the Sierra del T6+eleno, León province (NW Spain). Three permanent plots ( $10 \times 20 \text{ m}^2$ ) were established in the burned area in 1998. Twenty inventories of  $1 \text{ m}^2$  were marked in each plot. The number of pine seedlings and their height 1, 2 and 3 years after fire were recorded in each inventory. In the same inventories at the same time, regeneration of vegetation was analysed by visual estimation. The significance of linear correlations among the number of seedlings and woody understory vegetation cover (except *Pinus pinaster* cover) was tested by calculating Pearson correlation coefficients.

Very high natural regeneration of the *pinus* seedling was observed, with a mean of 22 seedlings/ $\text{m}^2$  found in the first year following the fire and after the first rains. However, the number decreased to 9.7 and 8.9 seedlings/ $\text{m}^2$  2 and 3 years after the fire. However, there was heterogeneity in number of the *Pinus pinaster* seedlings between the three study plots. In general, the plot with northern exposure, higher humidity, good soil conditions and a large quantity of seeds in the soil bank showed better regeneration than the other two. On the other hand, the plot situated with S–W exposure, low humidity and worse soil conditions showed poor regeneration. The woody

cover represented minimal regeneration during the first years after fire and it increased greatly during the second and third year. In plots with higher woody cover and number of *Pinus* seedlings (P1, P3) there was significant negative correlation between the number of seedlings and woody cover in time. However, in the plot (P2) with a smaller number of *Pinus* and less woody cover there was no significant correlation between both variables. That meant no significant influence between seedlings and woody cover when there was scarce woody regeneration and also a low number of seedlings. In this case, there was no inter-specific or intra-specific competition. However, in P2 the number of seedlings was enough to insure the natural regeneration of *Pinus pinaster*.

In the study of the correlation between woody cover and number of *Pinus* seedlings each year in the three plots, there was no correlation during the first year. However, during the second year the increase in vegetation cover favoured the increase in number ( $r = 0.19$ ,  $P < 0.05$ ) of seedlings. After this period the increase in number of *Pinus pinaster* seedling had no correlation with woody species.

Therefore, the regeneration of *Pinus pinaster* seedlings was negatively influenced by the woody vegetation present in the understory, but when there were a high number of seedlings the regeneration of the tree species was successful.