Modulation of interactions between bramble thicket and oak seedlings by stress (light, water and simulated browsing)

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Abstract

Plant-plant interactions are one of the main mechanisms structuring plant communities. However, the change in nature, intensity and importance of plant-plant interactions along productivity gradients is subject to debate among scientists. We studied the effects of combined abiotic (light and water) and biotic (simulated defoliation - herbivory) stress on the interactions between *Quercus petraea* (oak) seedlings and *Rubus sect. fruticosi* (bramble) thicket in order to better understand seedling recruitment dynamics. We found a general pattern with an intensity of competition remaining constant along gradient (reduction in the performances of oak as a consequence of the presence of bramble) and an increase in importance of competition with increasing light availability (impact of bramble on oak expressed as a proportion of the total impact of the environment on oak). Moreover, both intensity and importance of competition were positively correlated with competitor density modulated by herbivory. To understand the mechanism behind this change, we used Structural Equation Modeling. We found that abiotic stress and temporarily defoliation decrease bramble development. Bramble thicket, in turn, modifies below-canopy microclimate (air humidity, air temperature and light availability). However, only the light level affects diameter growth and survival of oak seedlings. We showed that forest renewal depends on the interaction between seedlings and their competitors and that the intensity, nature and importance of interactions are modulated by light availability and/or competitor density (modulated by herbivory). Thus, future forest management should take into account understory to minimize the impact of global change.

Keywords: Capreolus capreolus, Rubus sect. fruticosi, Quecus petraea, competition

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