



Short- term effects of silvicultural treatment on net nitrogen mineralization in a Mediterranean oak forest

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Forest productivity is strongly linked to nitrogen (N) uptake and N net mineralization. Under Mediterranean climate, soil water content and soil biological activity are highly variable. This determines the N availability, which is restricted by low soil water content in summer and low temperature in winter. Silvicultural treatments often alter nutrient fluxes inducing changes in environmental conditions and biological activity. The aim of the study is to examine the short term responses of soil carbon (C) and N to a thinning treatment. The study site is a marginal oak forest located in Valencia (East of Spain). Two contiguous plots, control and treatment, of 1800 m² area, respectively, were selected. The orientation (NW), slope (30 %) and initial forest density (861 tree per ha) were the same for both plots. Treatment plot was thinned on May, 2012, following the forest manager's requirements, reducing the forest density from 861 to 414 tree per ha. Control plot was not thinned. Net nitrogen mineralization, net nitrification and nitrogen leaching under 15 cm depth were determined by in situ measurements in both, thinned and control plots, using the resin-core method. Soil samples were uniformly distributed along the slope (top, middle and bottom). Cores were replaced every two months to obtain seasonal variation of nitrogen mineralization along the year. Furthermore, laboratory respiration, soluble organic carbon (SOC) and microbial biomass carbon (MBC) evolution were also estimated in the soil used in the field incubations. Soil water content and temperature at 5 cm depth were continuously recorded using FDR sensors (EC-TM, Decagon Devices Inc., Pullman, WA) connected to several ECHO₂ (Decagon) data-loggers .

All the biological parameters measured significantly varied along the year. In general, higher values of SOC and MBC were found in the thinned plot samples, but differences were not statistically significant. A significant effect of the thinning was found in soil water content, nitrate content and nitrate leaching. In this sense, short term effect of forest management appears to increase nitrification process. Therefore, the risk of nitrogen losses by leaching is also increased.