Oak decline reduces the stability of soil processes against changes in soil moisture and temperature predicted by climate change scenarios

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INTRODUCTION

Quercus suber forests of the Iberian Peninsula are affected by severe problems of tree decline induced by global-change drivers, mainly invasive pathogens and drought.

MATERIAL AND METHODS

Soil incubation experiment in lab (28 days)
Full factorial design with 3 factors: Temperature, soil moisture and tree health status
Study site: Alcornocales Natural Park in Southern Iberian Peninsula

RESULTS AND DISCUSSION

Soil variables were negatively affected by a decrease in soil moisture and by Q. suber decline, but positively affected by an increase in temperature. The effects of soil moisture and tree decline were however of much larger magnitude than those of temperature.

Effect of decrease in soil moisture on:

C mineralization
P and N availability

CONCLUSIONS

Predicted soil moisture reduction and Q. suber decline decreased C mineralization and nutrient availability, meanwhile the predicted increase of temperature had a low impact on these variables.

An interactive effect of soil moisture and tree health status on nutrient availability was detected. Thus, Q. suber decline amplified the negative impact of reduced soil moisture on nutrient availability.

Our results suggest that Q. suber decline might slow down nutrient cycling, and this effect could be magnified in the near future by climate-change type drought.