

**Habitat fragmentation is linked to cascading effects on soil functioning and CO₂ emissions
in Mediterranean holm-oak-forests**

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Supplementary

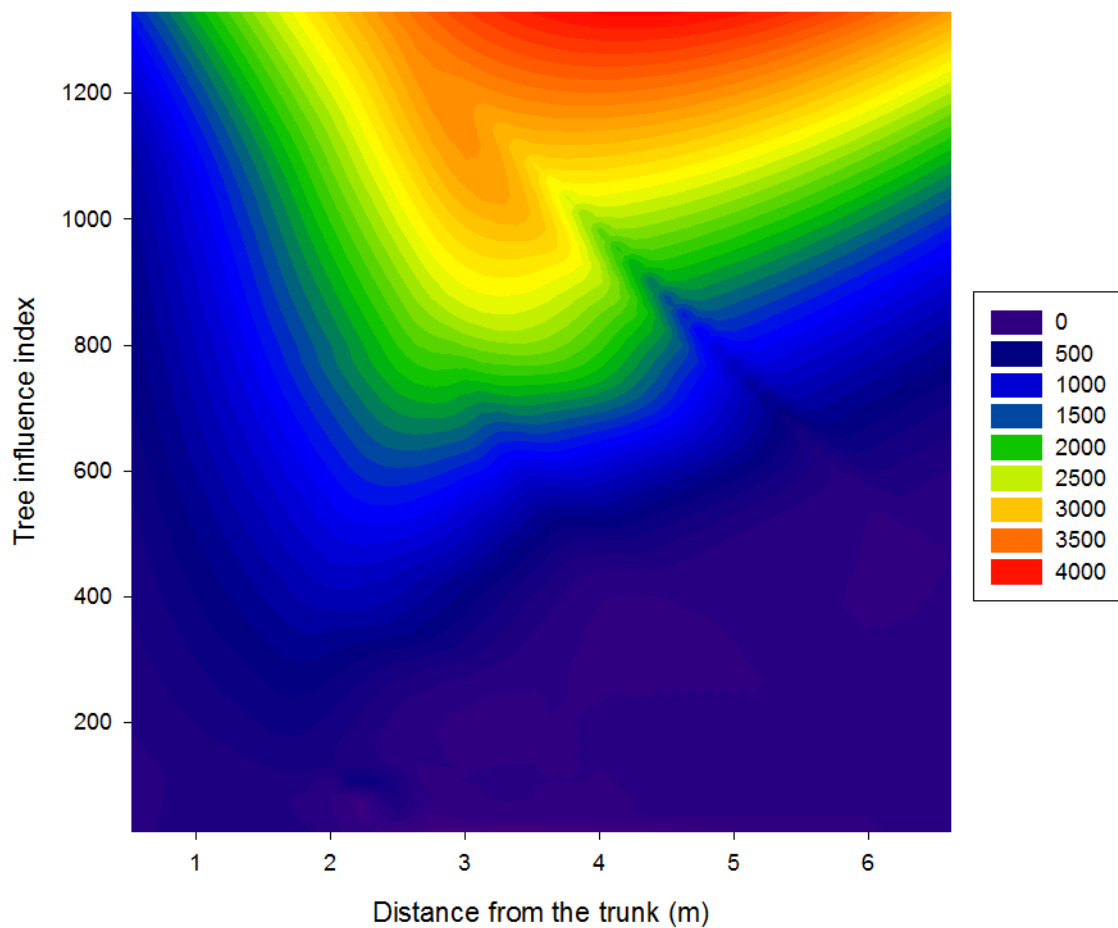


Fig. S1 Contour graph of the tree influence index (y-axis), the distance from the trunk (x-axis) and the basal area measured at 25 cm from the ground (D_{25}) (z-axis; cm²).

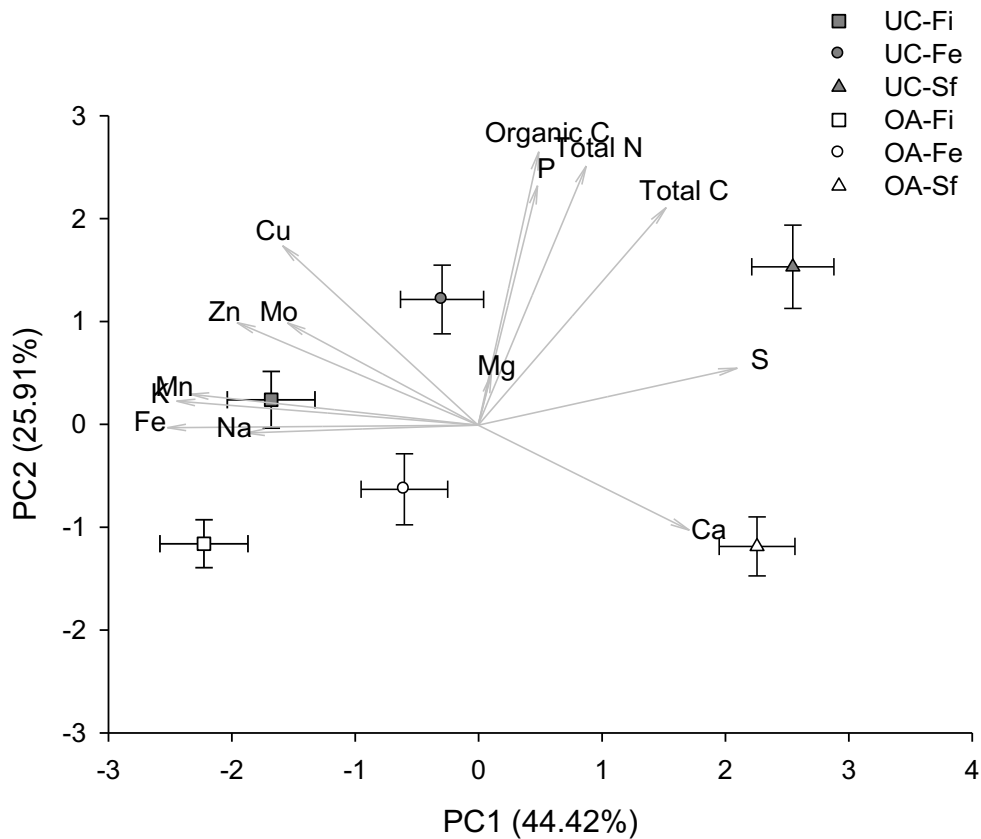


Fig. S2 Principal Component Analysis (PCA) of soil nutrients (scores and eigenvectors) from three levels of forest fragmentation under canopy and open areas in a Holm-oak forests in Spain. Coverage is represented by different colors: gray = under canopy (UC); white = open areas (OA). Soil provenances are represented by different symbols: squares = forest interior of large fragments (Fi); circles = forest edge of large fragments (Fe); triangles = small fragments (Sf). Error bars represent standard error (taken from Flores-Rentería et al., 2016).

Table S1 Tree cover and matrix influence effects in soil metabolism, biotic and abiotic properties and tree characteristics, of Holm oak forest fragments in Spain (one-way ANOVA). Tree cover, n=45 and matrix influence, n=30. Significant effects ($p < 0.05$) are noted in bold. MI = Matrix influence. C = tree cover. R_s = soil respiration. SOM = soil organic matter.

| | | Under canopy | Open areas | Forest interior | Forest edge | Small fragments |
|---|---------------|----------------------------------|----------------------------------|-----------------------------------|----------------------------------|-----------------------------------|
| | | MI | MI | C | C | C |
| β -glucosidase ($\text{pmol min}^{-1} \text{mg}^{-1}$) | F <i>p</i> | 6.53 <0.001 | 13.80 <0.001 | 57.34 <0.001 | 14.40 <0.001 | 17.11 <0.001 |
| Chitinase ($\text{pmol min}^{-1} \text{mg}^{-1}$) | F <i>p</i> | 1.99 0.15 | 4.53 0.02 | 8.37 0.01 | 12.25 <0.001 | 39.00 <0.001 |
| Phosphatase ($\text{pmol min}^{-1} \text{mg}^{-1}$) | F <i>p</i> | 5.79 0.01 | 0.42 0.66 | 56.85 <0.001 | 36.70 <0.001 | 64.97 <0.001 |
| R_s ($\mu\text{mol (CO}_2\text{) m}^2 \text{s}^{-1}$) | F <i>p</i> | 0.84 0.44 | 2.89 0.07 | 1.70 0.20 | 4.81 0.04 | 1.34 0.26 |
| SOM (%) | F <i>p</i> | 1.81 0.18 | 0.89 0.42 | 28.99 <0.001 | 21.93 <0.001 | 14.62 <0.001 |
| pH | F <i>p</i> | 0.75 0.48 | 1.19 0.31 | 12.89 <0.001 | 7.50 0.01 | 7.78 0.01 |
| Soil moisture (%) | F <i>p</i> | 1.27 0.29 | 4.93 0.01 | 35.62 <0.001 | 4.57 0.04 | 19.52 <0.001 |
| Soil temperature (°C) | F <i>p</i> | 3.41 0.04 | 7.13 <0.001 | 129.08 <0.001 | 23.97 <0.001 | 120.26 <0.001 |
| Tree basal area (cm^2) | F <i>p</i> | 8.79 <0.001 | - - | - - | - - | - - |
| Tree height (m) | F <i>p</i> | 10.09 <0.001 | - - | - - | - - | - - |
| Tree canopy (m^2) | F <i>p</i> | 12.02 <0.001 | - - | - - | - - | - - |
| Tree influence index | F <i>p</i> | 5.08 0.01 | 5.80 0.01 | 29.01 <0.001 | 23.77 <0.001 | 12.58 <0.001 |
| Bacterial richness (S) | F <i>p</i> | 4.36 0.019 | 3.93 0.027 | 0.66 0.123 | 2.34 1.38 | 0.30 0.59 |
| Fungal richness (S) | F <i>p</i> | 1.34 0.26 | 0.73 0.49 | 0.081 0.77 | 0.50 0.49 | 1.57 0.22 |
| Microbial biomass (mg C kg^{-1}) | F <i>p</i> | 2.42 0.10 | 1.47 0.24 | 31.65 <0.001 | 28.15 <0.001 | 13.83 <0.001 |