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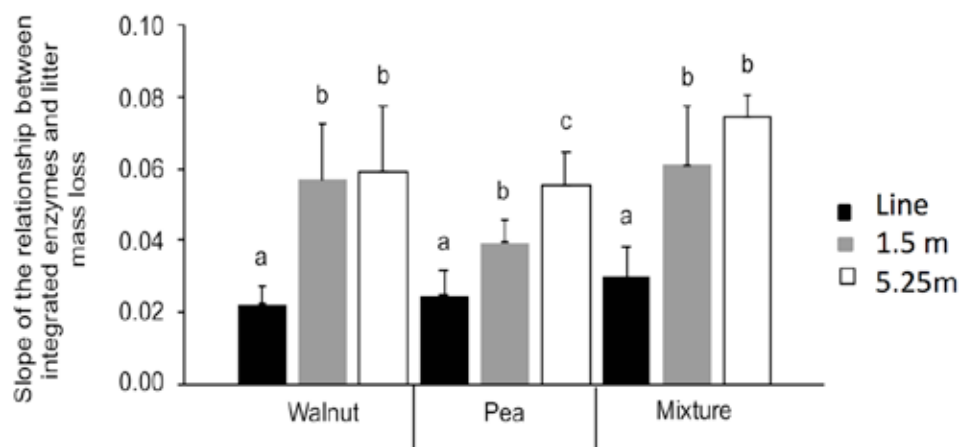
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Spatial gradient of soil decomposers' activities in a Mediterranean agroforestry system

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In alley-cropping agroforestry systems, contrasted litters from the intercropped annual and perennial plants are more or less mixed in the field. Our aim was to unravel the drivers of C, N and P mineralization in such a heterogeneous agroecosystem. We hypothesized that there is a spatial gradient of functional capacity of decomposers perpendicular to the tree line and that litter would be the most decomposed under the tree row. We thus conducted an *in situ* experiment for 7 months at Restinclières (France) with walnut trees intercropped with peas/cereals. We placed litterbags made of a mixture of pea and walnut leaves, or each of the two separately, on the tree row, at 1.5 and 5.25 meters away from it. After 2, 4 and 7 months, we measured soil microbial activity, litter quality and mass loss. Our results showed a significant effect of litter quality on both decomposition rates and microbial biomass C, N, P contents. Soil decomposers on the tree row appeared to be less efficient for litter decomposition than those in the interrow, based on relationship between C-enzymes activities and litter mass loss. We assumed that these decomposers feed on other C-sources available under the tree row to maintain a high turnover and biomass, which could explain the higher absolute C-enzyme activities. The position in the agroforestry plot was the main driver of soil decomposers' activities, whatever the added litter type.



Enzymatic efficiency for C-enzymes corresponding to the slopes of the regression of litter mass loss as a function of cumulative C-enzymes produced between 52 and 188 days, for walnut leaves (walnut), pea and mixture of pea and walnut leaves (mixture). Data are means (n=5), bar represent standard deviation and different letters means significant difference between positions for one litter type.

Keywords: Agroforestry, Litter decomposition, Enzymatic activities, Spatial gradient.