Changes on Soil Organic Carbon Stocks in a Mediterranean high mountain ecotone

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One of the Southern distribution limits of the Scots pine (Pinus sylvestris L.) is located in the Sistema Central Range of Spain, where this tree species is present above 2000 m.a.s.l. The pine treeline is in contact with high mountain grassland and shrubland areas, defining a Mediterranean forest ecotone. Because ecotone areas are mainly climatically driven, one of these areas has been chosen for detecting ecosystem consequences of a treeline expansion into the grassland-shrubland areas. A conversion from grasslands to Scots pine forests may provoke variations in physical, chemical and biological soil properties and therefore changes in soil organic carbon (SOC) stocks.

Here, we present a study carried out on the grassland-forest ecotone considering three different vegetation types: high mountain grassland-shrubland, shrubland-Scots pine high mountain forest and Scots pine mountain forest. We worked on the hypothesis that different plant species compositions influence both quantity and quality soil organic matter, as a result of the different C inputs to the soil. To test this assumption, soil from the first 30 centimetres has been analysed studying total SOC stocks, different particulate organic matter pools and microbial biomass C to elucidate if there are differences in SOC quantity and quality.

Results do not show significant differences ($p > 0.05$) in total SOC stocks among vegetation types when considering the first 30 cm of the soil profile (75.9 ± 6.6 Mg C ha-1, 71.9 ± 15.3 Mg C ha-1 and 71.7 ± 14.2 Mg C ha-1 for high mountain grassland-shrubland, shrubland-Scots pine high mountain forest and Scots pine mountain forest, respectively). However, there are significant differences ($p < 0.05$) at the uppermost 5 cm (17.4 ± 2.8 Mg C ha-1, 12.1 ± 1.9 Mg C ha-1 and 13.4 ± 5.4 Mg C ha-1 for high mountain grassland-shrubland, shrubland-Scots pine high mountain forest and Scots pine mountain forest, respectively), indicating differences in the SOC distribution across the soil profile. In addition, results on SOM quality analyses will be presented.