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Soil organic fraction and its biological activity as parameters to assess soil quality .

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To analyse soil quality, a number of soil attributes may be required in any situation, and different approaches are taken. Thus, new methods based on the study of pedological microfaune have been recently proposed to assess soil quality. This work aims to study the effect of soil degradation on its biological and chemical properties. For this purpose, soils with different degradation statuses (natural soils with potential vegetation, soils degraded by deforestation and cultivated dry-land soils) and different parent materials were selected. A rural area of the Valencian Community (E. Spain) was chosen because it includes forest soils (natural soils unaffected by human activity), and soils affected by both the deforestation process and agricultural uses. In the study area, sampling points were selected, soil formation factors were identified, edaphic properties were characterised and different soils were classified. Likewise, those aspects implicated in the soil biological activity were studied by determining the following: soil organic matter, humine fraction, humic acids, fulvic acids, humification grade, respiration rate, and microarthropode populations. In addition, infrared spectra from the organic fraction were also obtained. The sampled soils are representative of the Mediterranean area of the Iberian Peninsula and correspond to the following soil subunits (WRB-FAO): mollic Leptosols, rendzic Leptosols, haplic Leptosols and calcaric Regosols. Significant qualitative and quantitative differences were found. The results show important variations in soil organic matter content with high humina fraction values in mollic Leptosols under oak wood, irrespectively of the parent material and the bioclimatic belt. The infrared spectra support the obtained results for the soil organic fractions. Moreover, soil characteristics and biological properties related with microarthropode populations and associations among them were established. Thus, the effects of the degradation of potential vegetation and inadequate soil use were the reasons for a considerable decrease in soil organic matter, humification grade, respiration rate and the microarthropode populations. Significant relations between soil organic matter and respiration rate, and between the polymerization index and the number of microarthropodes in soils submitted to different degradation statuses, were found, indicating that all the studied parameters are good soil degradation status indicators. Microarthropode populations changed when the soil type was higher in mollic Leptosols. The larger populations correspond to the Colembola group and to the Acaros class. In conclusion, the results obtained herein show that the study of soil microarthropode populations can be employed as a bioindicator of soil quality.