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Comparison of soil organic matter composition under differentland uses by DRIFT spectroscopy

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Soil organic matter (SOM) plays vital importance for biological, chemical, and physical soil improvement and productivity. Organic matter composition also depends on different types of vegetation covers. Thus the study was aimed to estimate and characterize the soil organic matter (SOM) under different land uses (cropland, grassland, and forestland) and depths (0-10 cm, 10-20 cm, and 20-30 cm) in Prague Suchdol. Ninety samples of disturbed soil were collected within different land uses and within different depths. The soil organic matter (SOM) composition was assessed by diffuse reflectance infrared fourier transform spectroscopy (DRIFT). Humic and fulvic acid were extracted from soils and their composition was also assessed by DRIFT. Additionally, dissolved organic carbon (DOC), humus quality as ratio between absorbances of soil extract with sodium pyrophosphate at the wavelengths 400 and 600 nm, soil organic carbon (by the rapid dichromate oxidation technique), were determined on the samples as well as physical characteristics as bulk density. The data were analysed statistically by statistical package for the social sciences (SPSS) version 20. The results indicated that pH_{KCl} is significantly different among land uses. Cropland had the highest values of pH_{KCl} with a range from 7.76 to 6.86, followed by grassland with a range from 5.72 to 5.93 and forestland with 3.34 to 3.65, respectively. However, the humus quality was significantly different for all depths where forestland had the lowest humus quality compared to grassland and cropland, respectively. The soil organic carbon deviates statistically in depth 0-10 cm and 20-30 cm, while the depth in between from 10 to 20 cm showed no substantial difference among the land uses. Nonetheless, the result revealed that the largest differences of the spectra in the composition of organic matter were observed in the upper parts of the soil profile. The forest soil spectra had more intense aliphatic bands, carboxylic, and CH bands than spectra of grassland and cropland soils. The difference of HAs spectra was at 3 010 to 2 800 cm^{-1} where the most intensive aliphatic bands were in forest soil HAs, followed by grassland and cropland soil HAs. The grassland topsoil FAs spectrum differs most from the other land uses. It has lower peaks around 1 660–1 600 cm^{-1} and 1 200 cm^{-1} than cropland and forest. The concentration of low molecular mass organic acid (LMMOA) was the highest in the forest soil and the most abundant acid was citrate.