



Soil humus composition - comparison between mountain grasslands and forest lands with different land-use intensity

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Soil humus is a dynamic characteristic greatly vulnerable to land use and climate and with important feedbacks to the atmospheric green house gas balance and the rate of climate change. The increased demand for accurate soil carbon stocks assessments and predictions of its changes as a result of land use/cover and climate change has triggered large-scale and long-term measurements of soil organic matter specifics. We studied the soil humus composition in four mountain grasslands, differentiated according to the land-use sub-type and land-use intensity and four forest lands. Two pastures – with intensive (Pi) and extensive grazing (Pe) and two meadows- managed (Mm) and unmanaged (Mu) were objects of present study. Two spruce plantations (*Picea abies* Karst), and two natural beech forests (*Fagus sylvatica* L.) – control, unmanaged for the both (Su and Bu) and with 10 % cutting intensity (Sc and Bc).

Humus composition was analyzed following the methodology of Kononova-Belchikova. The aggressive and mobile fulvic acids predominated in all of the investigated plots, except Pe and Bu. Humic acids are “free” and bonded with R_3O_3 and no Ca-bonded humic acids were established under the grasslands, but in the soils under the two beech forest we observed Ca-bonded humic acids in small quantities. The values of total org. C and C-extracted by 0.1 N NaOH was similar in most of studied horizons.

Our results showed that the highest total carbon content was localized in the organic-mineral soil horizon and decreased toward deeper soil. The highest total carbon content estimated at 14.04 % was determined in A-horizon of soil in pasture with extensive grazing, for the grasslands. The higher grazing disturbance in Pi leads to increase root biomass in patch areas and in inter-patch upper soil related with decrease of soil humus content. We supposed that the reduced amount of litter input with increased recalcitrance to decomposition provoked the reduction of organic carbon content and in changes in its composition under intensive grazing. The extensive pasture management in mountain areas is better land-use approach in the perspective of soil humus quality improvement. The managed meadow in mountain areas accumulated more carbon in superficial soil, but the composition of soil humus is similar to this in unmanaged grassland.

Both European beech and Norway spruce stands had higher accumulation of organic matter in the forest floor and the Ah horizon under unmanaged conditions. For the forest lands the highest total carbon content was found in the soil under the spruce forest – 9.5 %. In the managed forests, carbon contents tended to be higher in deeper horizons of the mineral soil, probably due to differences in microclimate after cutting. However, the variability in carbon storage was higher in managed sites which may reflect a higher degree of disturbance.