Theme 1
Status and trends of global soil nutrient budget

SOM difference between four different land uses (case study: Magyarlukafa)

Malihe Masoudi[1], Csaba Centeri[1], Gergely Jakab[2,3] , Viola Judit Prohászka[4]

1Institute of Wildlife Management and Nature Conservation, the Hungarian University of Agricultural and Life Sciences, Gödöllő, Hungary, e-mail: Masoudim65@gmail.com, centeri.csaba@uni-mate.hu
2Geographical Institute, Research Centre for Astronomy and Earth Sciences, Budapest, Hungary, e-mail: jakab.gergely@csfk.org
3Institute of Geography and Earth Sciences, ELTE Eötvös Loránd University, Budapest, Hungary
4Hungarian University of Agriculture and Life Sciences, Doctoral School of Landscape Architecture and Landscape Ecology, Villányi Rd. 29-43. 1118, Budapest, Pest, Hungary; prohaszka.viola.judit@phd.uni-14 mate.hu

INTRODUCTION

The soil organic matter (SOM) content is a main factor affecting the function and health of soil, ecosystems, and is an important indicator of long-term land management. It is well recognized that soil organic matter increases structure stability, resistance to rainfall impact, rate of infiltration, and faunal activities.
The amount of SOM is controlled by the inputs of organic matter into the soil profile, and losses predominantly due to microbial decomposition.
Different land-use managements (e.g. agricultural, forest) influence soil properties and eventually soil quality.

METHODOLOGY

In this study, we investigated the impact of different land use managements (Garden/arable land, Orchard, Forest, Meadow/grassland) on SOM content in the surface (0-30 cm) and down to the subsoil (30-60 cm) based on 42 soil samples in southeast Hungary under similar climatic and pedogenic conditions (Figure 1). The soil samples were measured using the Hungarian standard MSZ-08-0210-1977 based on the Walkley-Black method for SOM content.

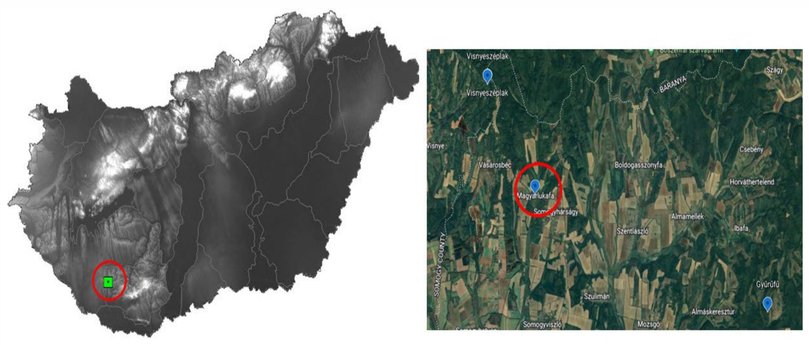

Figure 1: Location of study area where soil samples were taken

RESULTS

Based on the results (Table and fig 1), land use of forest showed the highest percentage of organic matter (OM) content in the surface soil, followed by, grassland, orchard, and garden/arable land respectively. According to multiple ANOVA comparisons, we can see a significant difference between land uses in surface soil, especially between garden/arable land and forest. Also, we found differences between forest- orchard/arable land and between grassland- garden/arable land (P-value < 0.05). However, there is no difference between different land uses in the subsoil of 30-60 cm (P-value > 0.05). The results of the comparison are summarized in table 1. Also according to One-way ANOVA analysis, there is a significant difference between SOM in surface soil and subsoil (P-value <0.000). In all land uses, surface soil had higher SOM content compared to the subsoil.

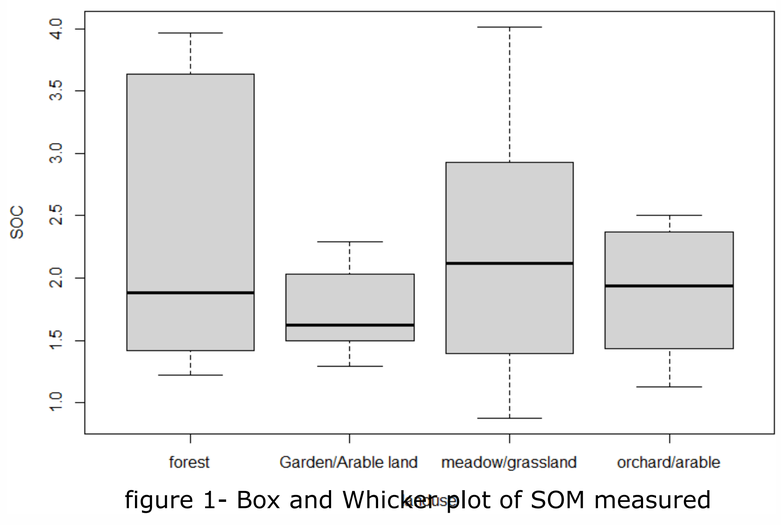

figure 1- Box and Whicker plot of SOM measured

Table 1- Summary Statistics for SOM %

	garden/arable land		orchard		forest		meadow/grassland	
	0-30	30-60	0-30	30-60	0-30	30-60	0-30	30-60
Avr	1.9	1.6	2.3	1.5	3.4	1.4	2.9	1.4
Sum	11.5	8.0	11.5	7.6	17.0	7.1	14.5	7.1
Standard deviation	0.26	0.2	0.18	0.3	0.63	0.1	0.70	0.5
Max	2.3	2.0	2.5	1.9	4.0	1.6	4.0	2.1
min	1.6	1.3	2.0	1.1	2.2	1.2	2.1	0.9
med	2.0	1.5	2.4	1.4	3.6	1.4	2.9	1.4

CONCLUSIONS

According to the results OM decreases with depth in all land-uses. Among different land-uses, natural areas (forest and grassland) showed a higher percentage of SOM compared to two other land uses (orchard and garden/arable land) in surface soil.
Also, in surface soil, garden/arable land shows significant differences with natural land uses (forest and grassland). It can be the result of tillage operation in the garden/arable land which caused sudden aeration into the soil profile, resulting in increased available oxygen concentration for the microorganisms and leading to a higher rate of organic matter decomposition in the soil. However we observed the differences between forest and arable land is higher than the differences between forest and orchard. It can be might due to remaining litter in orchard.

Table 2- Multiple comparison ANOVA to determine which means are significantly different from which others

SOM in surface soil (0-30 cm)		
Land uses	t	Sig
Garden/Arable land - Forest	-4.4	**
Grassland - Forest	-1.4	-
Orchard - Forest	-3.1	*
Grassland - Garden/Arable land	2.9	*
Orchard - Garden/Arable land	1.1	-
Orchard - Meadow/grassland	-1.6	-
SOM in surface soil (30-60 cm)		
Garden/Arable land - Forest	0.6	-
Grassland - Forest	0	-
Orchard - Forest	0.4	-
Grassland - Garden/Arable land	-0.6	-
Orchard - Garden/Arable land	-0.1	-
Orchard - Meadow/grassland	0.49	-

Also, results in the subsoil showed a higher percentage of OM in garden /arable land and orchard than OM in grassland and forest. It can be also due to tillage operation which causes turnover of surface soil to lower depth in this land use.
In the final, we found that different land use mostly effects SOM in surface soil.

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