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Introduction

- In temperate deciduous forests, soils are frequently poor in mineral nutrients, partly accounted for the nature of the vegetation, because the annual production of leaves or the development of a dense broad-leaved canopy requires a significant input of nutrients.
- The foraging activity of the wild boar (or rooting) overturns extensive areas of soil, leaving them bare of vegetation, causing a soil disturbance with important effects on the dynamics of native plant communities. Additionally, natural processes like sedimentation have been enhanced and accelerated due to human activity.
- Wild boar rooting can affect the organic topsoil by removing it locally or mixing it with mineral soil.
- In Hungary, the population size of wild boar has increased over the past several decades, mainly due to its importance as a game species, causing damages to crops and forests.
- Due to the depth of the rootings, it is expected to reach the C horizon faster inside them than in other parts of the forest. Also, it is expected to have higher amounts of organic matter in the r

Aim of the study

The aim of this study is to compare the impact on soil horizons and soil chemical properties in different sections of wild boar rootings in sedimented areas of a deciduous forest.

Study Area

The study was carried out in the “Gudra-Oldal” of the Babat valley, a part of the Gödöllő Hillside Landscape Protection District, which is part of the Natura 2000 network. It is located in Gödöllő, Pest County, Hungary (47°36'56.61"N, 19°22'50.40"E). The study area comprises 40 ha of mixed broadleaved coniferous and deciduous forest with eroded areas, from which 21.5 ha were selected for random sampling due to the presence of sedimented areas within it.

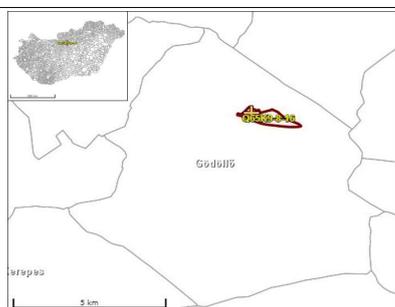


Fig 1. Study area – Gudra-Oldal in the Babat Valley.

Materials

Soil horizons were analyzed with a 100 cm stainless steel probe. A Near Infra-Red Spectrometer (NIR AgroCares scan) (Wavelength Range: 1300–2600 nm MEMS technology) was used to analyze soil parameters.

Sampling method

Five (5) deep rootings (depth>30 cm) of wild boar were randomly selected in a sedimented area of the Babat Valley. 3 samples were analyzed on each rooting: inside, on the ring, and outside, for a total of 15 samples on each rooting. Sampling for soil horizons analysis was performed with a 100 cm stainless-steel probe and analyzed on site, and samples of 0-30 cm depth were taken in the center of the rooting, in the ring, and outside, for soil parameters analysis with the NIR scanner.



Fig 2. NIR scanner used for analysis.

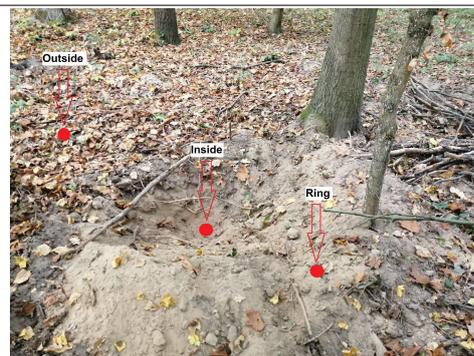


Fig 3. Samples were taken in 3 points on each wild boar rooting.

Data Analysis

Soil horizons were analysed qualitatively, whereas values for organic matter (OM) and cation exchange capacity (CEC) were analysed using descriptive statistics.

Results

As expected, it is easier to reach the C horizon in the middle of the rooting, also more presence of calcium carbonate (CaCO₃) was found in these samples. The ring samples don't have detectable presence of CaCO₃. On average, OM is higher on the ring and lower on the middle of the rooting, whereas CEC is higher inside the rooting but lower outside the rootings.



Fig 4. Soil horizon analysis. Rooting (A), Ring (B) and Control (C)

Discussion

The results are as expected in the hypothesis, according to which inside the rootings, the OM is lower due to the removal and accumulation of lower layers of soil on the ring. Although it is expected that sedimented areas have a lower amount and variety of vegetation and soil macrofauna, it is worth noting that in the Babat Valley there seems to be a significant amount of rooting in these areas, therefore the rooting behavior can be related to factors besides the search for food, for which further experiments are required. The smaller A horizon inside the rootings confirms the effect of wild boar rooting on soil organic matter content.

Table 1. Summary statistics for OM and CEC on each section of the rooting

OM	Control	Ring	Rooting
mean	3.1	4.06	2.34
sd	1.2124	1.2381	0.3507
median	3.4	3.9	2.3
min	1.2	2.7	1.8
max	4.2	6	2.7
se	4.2	6	2.7

CEC	Control	Ring	Rooting
mean	107.94	116.1	123.86
sd	32.4773	41.5126	43.1092
median	114	120.6	115.9
min	63.1	63.9	67.8
max	149.7	175.8	187.9
se	14.5243	18.5650	19.2790

Conclusions

Wild boar rooting has an important effect on soil horizons in sedimented areas. The organic matter moved to the ring of the rootings can affect the vegetation cover and alter the forest composition in the long term. Further analyses are required in order to evaluate the changes in soil characteristics compared to non-sedimented areas in the forest. The increase of wild boar population can increase the pressure on the soil and further affect its composition.

Acknowledgments

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