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**THE INFLUENCE OF AGRICULTURAL PRACTICES AND ENVIRONMENTAL
 FACTORS ON SOIL QUALITY FROM TORMAC, TIMIS COUNTY**

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Abstract: The soil represents the loose layer at the Earth's surface which, over time, has acquired its main characteristic—fertility—through the simultaneous and long-term action of natural pedogenetic factors. Originally, the Earth's crust was compact and unsuitable for plant development, consisting solely of rocks and minerals. Continuous interaction with the atmosphere, hydrosphere, and later the biosphere led to the disintegration and alteration of rocks, transforming the hard and compact mass into a loosened material capable of supporting plant life. This transformation marks the beginning of soil formation, during which processes such as the accumulation of organic matter, eluviation, and illuviation gradually shape the structure and properties of the soil.

The importance of soil is fundamental for all life on Earth, considering that over 90% of human and animal food originates directly or indirectly from it. The continuous reduction of arable land per capita—estimated to decrease to only 0.10 ha by the year 2150—highlights the need for innovative and sustainable technologies that can prevent soil degradation and maintain its productive capacity. Soil is regarded as the essential natural resource of efficient and sustainable agricultural systems and as the "heart" of terrestrial ecosystems due to its role as a reservoir of energy, water, and nutrients, as well as its direct influence on the process of photosynthesis. Humanity's relationship with soil dates back to ancient times, representing the foundation of the first agricultural revolution and the development of early agriculture, emphasizing the decisive role of soil in the evolution of human society.

• **Introduction**

Soil is a fundamental resource for sustaining life and agricultural production, with fertility determining ecosystem productivity. In Tormac Commune, 94.95% of the 13,406 ha area is agricultural land, while forests cover only 0.75%, highlighting its strong agrarian character. Despite favorable natural conditions, intensive farming has accelerated soil degradation through erosion, compaction, loss of organic matter, and structural decline. These processes reduce productivity and affect ecological balance, making sustainable soil management essential for long-term agricultural viability.



• **Results and discussions**

The assessment of soil fertility in Tormac Commune shows the progressive impact of the no-till system under subsistence farming conditions. In the initial phase, soils were characterized by compaction, high mineralized nitrogen, and low biological activity. Although early stages present temporary imbalances, long-term application leads to improved soil quality. Compared to conventional tillage, no-till reduces degradation, increases organic matter, and enhances biological activity. Overall, it represents a sustainable approach for maintaining and improving soil fertility in Tormac Commune.

• **Material and method**

The study was carried out in Tormac Commune, a hilly area characterized by small-scale farms typical of subsistence agriculture, focusing on representative plots of arable land and hayfields. Soil samples were collected from depths of 0–20 cm, 20–40 cm, and 40–60 cm, each consisting of mixed sub-samples obtained according to standard procedures. The collected data were statistically processed to identify trends and determine the main factors influencing soil fertility and productive capacity.

• **Conclusions**

This study highlights the importance of soil as a key natural resource for agricultural production, with fertility as its main function. In Tormac Commune, the predominance of agricultural land increases the risk of degradation under intensive farming practices such as repeated tillage, monoculture, and chemical input use, leading to erosion, compaction, and loss of organic matter.

The analysis shows that, although no-till systems may initially cause compaction and nutrient imbalances, their long-term application improves soil structure, organic carbon content, water retention, and biological activity.

In conclusion, sustainable land management practices are essential for preserving soil fertility and reducing degradation in Tormac Commune.

YIELDS OBTAINED IN WHEAT CULTIVATION USING MINIMUM TILLAGE AND NO-TILL TECHNOLOGIES

