UNIVERSITY OF LIFE SCIENCES ”KING MIHAI I” FROM TIMISOARA
”YOUNG PEOPLE AND MULTIDISCIPLINARY RESEARCH IN APPLIED LIFE SCIENCES”

05-06 November 2026



PEDOLOGICAL DIVERSITY AND IMPLICATIONS FOR SUSTAINABLE LAND-USE MANAGEMENT AT THE PLAIN–HILL CONTACT IN COVĂSÂNȚ, ARAD COUNTY, WESTERN ROMANIA

Ioana NICA[1], Nicoleta-Liliana TIGRIȘ[2], Alina LAȚO[1], L. NIȚĂ[1]

[1]University of Life Sciences “King Mihai I” from Timișoara, Faculty of Agriculture • [2]Școala Gimnazială Boldur, Timiș County, Romania

Corresponding author: lucian_nita@usvt.ro

Abstract: The study provides an integrated pedological assessment of Covăsânț, Arad County, located at the contact between the Arad Plain and the western foothills of the Zarand Mountains. Pedological mapping, field observations, profile morphology, laboratory data and land-use information were integrated to relate soil distribution to relief, parent material and water regime. Agricultural land occupies 84.60% of the territory; arable land represents 81.30% of agricultural land and vineyards 10.14%. Chernozems (38.86%), Vertisols (25.07%) and Eutric Cambisols (19.46%) dominate the soil cover. Four representative profiles demonstrate contrasting management constraints: erosion on shallow hill soils, temporary water excess, subsurface compaction and narrow workability windows on heavy clay soils. The results support spatially differentiated conservation, drainage, traffic and organic-matter management and establish a baseline for future dissertation-level GIS and soil-quality research.

Keywords: *soil resources; pedological mapping; land use; Chernozem; Vertisol; sustainable management; Covăsânț*

• Introduction

- Covăsânț lies at the contact between the Arad Plain and the Zarand foothills, creating strong short-distance contrasts in relief, lithology and drainage.
- The plain includes higher surfaces, a lower sector crossed by the Matca Canal and the former Ier floodplain; the hills are dissected and erosion-prone.
- Land use is intensive and diversified: arable farming dominates, while vineyards are an important specialised component.
- The study tests the principle that sustainable land management must be adapted to soil–landscape units rather than applied uniformly.

• Material and method

- Pedological survey using soil-land unit delineation, profile description, rapid field observations and laboratory analyses.
- Soil classification followed SRTS (2012) and the Romanian Methodology for Pedological Studies.
- Analysed properties included texture, bulk density, total porosity, field capacity, wilting coefficient, pH, $CaCO_3$ and humus reserve.
- Land-use and soil-map data were recalculated by area and percentage and interpreted against relief, groundwater, drainage and management constraints.
- Four representative profiles were retained: Lithic Regosol, weakly gleyed typical Chernozem, mollic Eutric Cambisol and gleyic Vertisol.

• Results and discussions

- Agricultural land covers 3,175 ha (84.60%); arable land represents 2,581 ha and vineyards 322 ha.
- Three soil types dominate: Chernozem 38.86%, Vertisol 25.07% and Eutric Cambisol 19.46%.
- Chernozems provide the main high-fertility resource, but the representative profile also records subsurface compaction.
- Vertisols/Pelosols cover 26.77% and require strict traffic and tillage timing because of shrink–swell behaviour and restricted workability.
- Hill soils require erosion control; low-lying sectors require drainage maintenance and avoidance of traffic under excessive moisture.

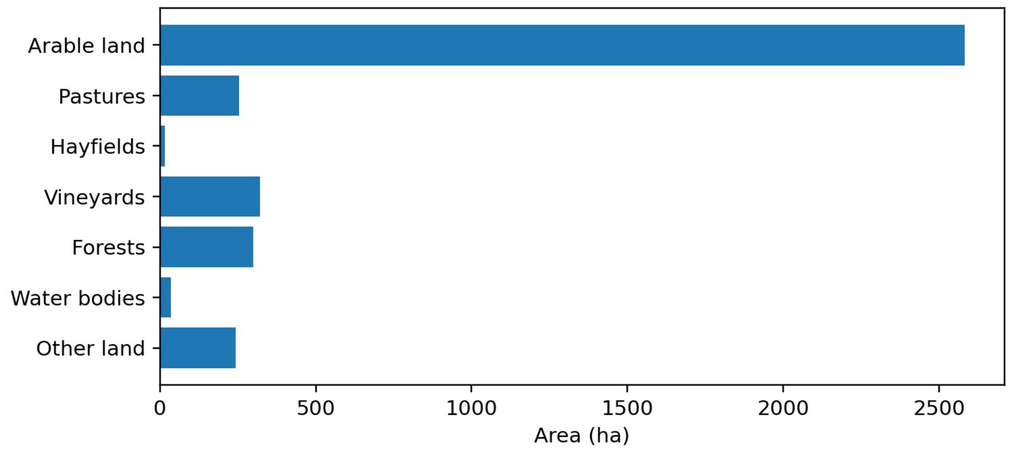


Figure 1. Land-use distribution in Covăsânț (ha)

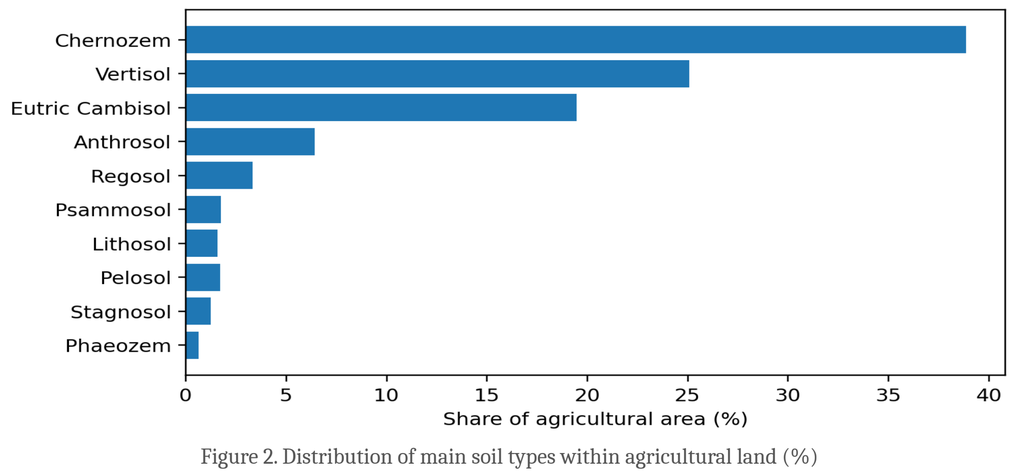


Figure 2. Distribution of main soil types within agricultural land (%)

• Conclusions

- Pedological diversity is controlled by the plain–hill transition, parent materials and groundwater depth; the territory cannot be managed as a uniform agricultural unit.
- Sustainable management should combine erosion control on slopes, drainage maintenance in depressions, reduced traffic on wet soils, structural protection and organic-matter inputs.
- The study provides a baseline for the future dissertation, where GIS zoning and stratified sampling can quantify soil quality, SOC, compaction, infiltration and related indicators.

Acknowledgement: The research in the present article was financed by the research contract no. ……