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

*05-06 November 2026*



# PEDOLOGICAL CHARACTERIZATION OF A LAND FOR THE ESTABLISHMENT OF A VINEYARD IN MĂDERAT, ARAD COUNTY

Alin Corneliu MINEA, Alexia Paula Valentina HAJDUK, Daniel Dorin DICU, Raul PASCALAU

*University of Life Sciences “King Mihai I” from Timisoara, Romania*

**Abstract:** *The assessment of the pedological and agrochemical properties of land intended for viticulture is essential for determining site suitability and informing land preparation and fertilization practices. This study aims to characterize a 1.10 ha land parcel located in Măderat, Arad County, Romania, based on pedological and agrochemical studies. The methodology involved examining soil classification, particle-size characteristics, and laboratory results obtained from soil samples collected at different depths, followed by a descriptive comparison of indicators recorded during the initial and final soil surveys. The soil was classified as a typical Eutric Cambisol, with medium loam and medium clay loam textures, and assigned to fertility class II for grapevine cultivation, with a land evaluation score of 72 points. Within the 0–40 cm soil layer, the mean values recorded between the two surveys increased from 6.90 to 7.00 for pH, from 1.95% to 2.20% for humus content, from 15.2 to 21.3 ppm for available phosphorus, and from 254 to 280 ppm for available potassium. Soil profile analysis also revealed an increase in clay content with depth, a characteristic relevant to soil water and aeration conditions. The findings indicate favorable conditions for vineyard establishment, although certain limitations are associated with soil texture and uneven terrain. Changes in agrochemical indicators were interpreted descriptively, without directly attributing them to fertilization practices, given the available evidence.*

## • Introduction

Vineyard establishment requires a soil assessment because rooting conditions, nutrient supply and drainage are difficult to correct after planting. This case concerns a 1.10 ha plot at Măderat, Pâncota (Arad County), within the Miniș–Măderat viticultural area. The study identifies its soil unit, examines texture and agrochemical fertility, and interprets the official land evaluation.

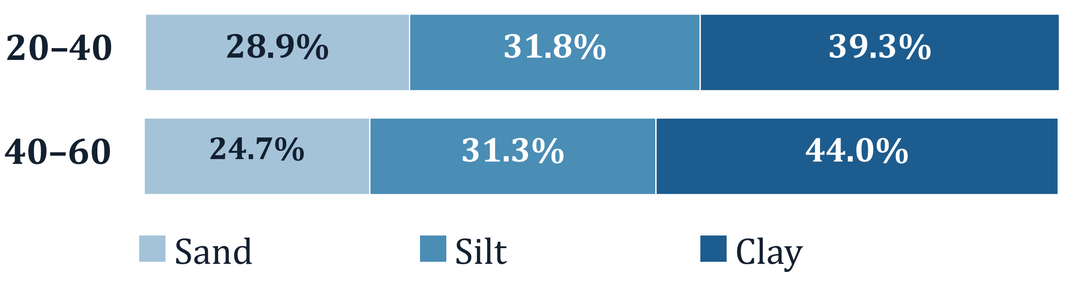
**Table 1. Site identification and setting**

| Attribute | Documented site characteristic |
|---|---|
| Location | Măderat, Pâncota, Arad County |
| Parcel / area | Block 158; Vn 1276/8/1; 1.10 ha |
| Soil unit | U.S. 1.01 – typical Eutricambosol |
| Parent material | Weathered, non-carbonate slope deposits |
| Regional climate | 10.3 °C mean; 593.5 mm annual rainfall |

## • Material and method

The retrospective analysis used the OSPA Arad initial mapping (soil samples collected 11 February 2015; Bulletin 198) and final mapping (6 April 2015; Bulletin 224), together with the vineyard execution project. Initial samples represented 0–20, 20–40 and 40–60 cm; final samples represented 0–20 and 20–40 cm. Measurements included pH in water, humus (Walkley–Black–Gogoasă), total nitrogen, nitrogen index, available P and K (Egner–Riehm), and particle size (Kacinski). Comparisons refer only to the common 0–40 cm interval and are descriptive, not experimental.

**Figure 1. Particle-size distribution by depth (cm)**




Clay increases by 4.7 percentage points (39.3% at 20–40 cm; 44.0% at 40–60 cm), while sand decreases from 28.9% to 24.7%.

### Scope and methodological limitations

One parcel and limited sampling dates were assessed. Hydraulic conductivity, compaction and crop yield were not measured; differences cannot establish causes or temporal trends.

## • Results and discussions

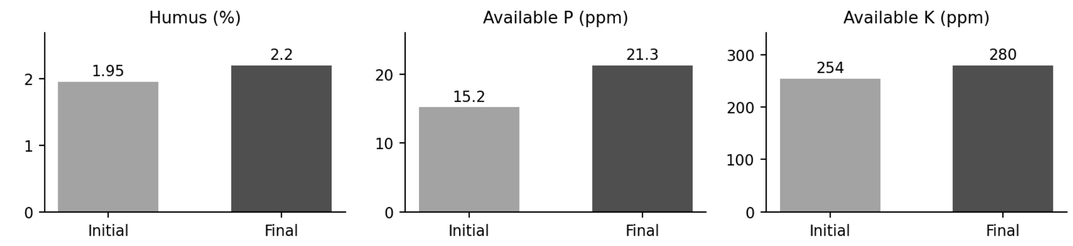
OSPA identified a typical Eutricambosol (loamy to clay-loamy). Final pH was neutral (7.00); humus, nitrogen index and mobile P were medium, and mobile K was very good. The vineyard land rating was 72 points (class II). Uneven terrain and soil texture posed reduced limitations.

**Table 2. Agrochemical means, 0–40 cm (OSPA 2015)**

| Indicator | Initial | Final | Difference | Final class |
|---|---|---|---|---|
| pH ($H_2O$) | 6.90 | 7.00 | +0.10 | Neutral |
| Humus (%) | 1.95 | 2.20 | +0.25 pp | Medium |
| Total N (%) | 0.098 | 0.110 | +0.012 pp | — |
| N index | 1.95 | 2.20 | +0.25 | Medium |
| P-AL (ppm) | 15.2 | 21.3 | +6.1 | Medium |
| K-AL (ppm) | 254* | 280 | +26* | Very good |

**Official initial K mean: 254 ppm (printed layer mean: 256.5 ppm).*

**Figure 2. Initial and final mean soil indicators**




All six final 0–40 cm indicators were higher, but surveys were less than two months apart. Without amendment records, causes cannot be established. Clay-rich subsoil warrants attention to aeration and compaction when wet.

**Table 3. Pre-planting recommendations (2015)**

| Input | Rate per ha | For 1.10 ha |
|---|---|---|
| Organic manure | 46 t | 50 t (reported) |
| $P_2O_5$ | 193 kg | 212 kg |
| $K_2O$ | 180 kg | 198 kg |
| $CaCO_3$ | Not required | Not required |

*Historical recommendations only; actual field application was not verified.*

## • Conclusions

The 1.10 ha parcel is suitable for a vineyard (72 points; class II), but the rating does not predict yield. Neutral pH and nutrient supply are favorable. Clay-rich subsoil and uneven terrain require careful preparation and runoff control. Before implementation, renew depth-specific sampling and assess drainage and compaction. Survey differences do not demonstrate fertilization effects.