UNIVERSITY OF LIFE SCIENCES ”KING MIHAI I” FROM TIMISOARA
”YOUNG PEOPLE AND MULTIDISCIPLINARY RESEARCH IN APPLIED LIFE SCIENCES”
05-06 November 2026



ANALYSIS OF PEDOCLIMATIC RESOURCES AND AGRICULTURAL LAND SUITABILITY FOR WHEAT CULTIVATION IN ȘIRIA COMMUNE, ARAD COUNTY

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STUDY FRAMEWORK

- SOIL RESOURCES
- WATER REGIME
- RELIEF & SLOPE

Climatic water availability interacts with soil drainage, root development and nutrient uptake.

INTRODUCTION

Wheat suitability is shaped by soil depth and texture, relief, drainage and climatic water availability. Șiria extends from the Arad Plain towards the Zarand Mountains, creating contrasting lowland, piedmont and upland environments. Deep, well-drained soils favour rooting, whereas excess moisture, salinity and sloping terrain may restrict crop development. Water availability during stem elongation, heading and grain filling is especially relevant to winter wheat. Assessing these factors together supports site-adapted cultivation and sustainable nutrient management.

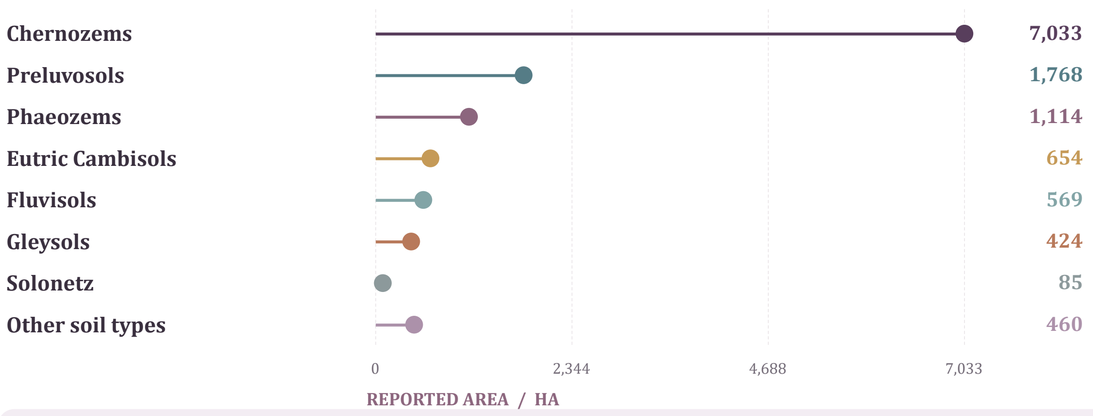
MATERIAL AND METHODS

The assessment integrates the Șiria development strategy, General Urban Plan, agricultural census and pedological synthesis of Țărău et al. (2023). Soil groups, land-use shares and arable quality classes were compared descriptively. Reference areas differ: 12,107 ha for soil distribution, 8,502 ha for quality classes and 13,673 ha for the administrative territory. Records from different years were not treated as evidence of change over time. Wheat suitability was assessed qualitatively through soil, terrain and moisture constraints; agrochemical mechanisms were interpreted using published research.

RESULTS AND DISCUSSIONS

MAJOR SOIL TYPES

Agricultural pedological reference area · 12,107 ha



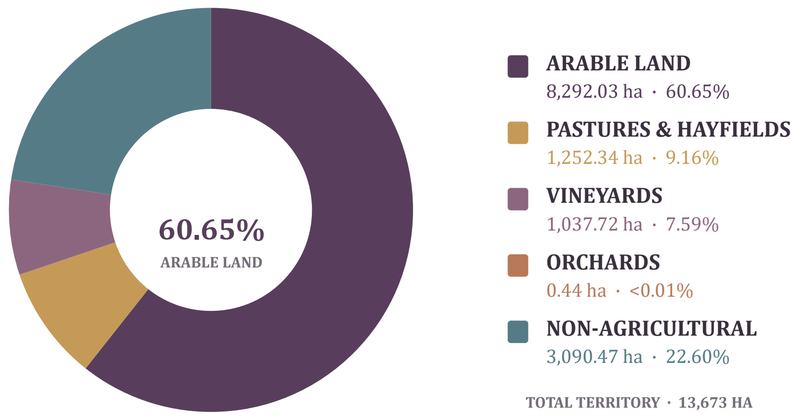
PEDOLOGICAL DISTRIBUTION

Chernozems occupy 7,033 ha (58.09%), followed by Preluvosols and Phaeozems; together, these three groups represent 81.89% of the agricultural reference area. This is an important soil resource for arable use, but taxonomy alone does not determine wheat suitability. Rooting depth, drainage and groundwater conditions can differentiate land units, while Gleysols and Solonetz signal local wetness or sodicity constraints.

Source: Țărău et al. (2023)

LAND-USE STRUCTURE

Territorial records reproduced in the local strategy



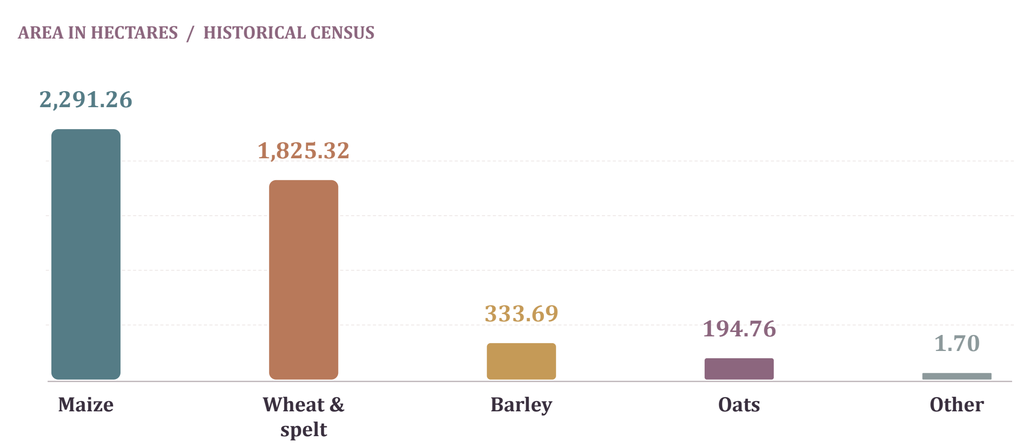
TERRITORIAL LAND USE

Arable land covers 8,292.03 ha (60.65% of the commune; 78.36% of agricultural land) in the earlier territorial records. Pastures, hayfields and vineyards reflect differentiated uses of the lowland and sloping landscape. The reported agricultural area totals 10,582.53 ha. These figures describe historical territorial allocation, not the area currently sown with wheat.

Source: Șiria Local Development Strategy (2014-2020)

CEREAL CROPPING PROFILE

General Agricultural Census · cereal area: 4,646.73 ha



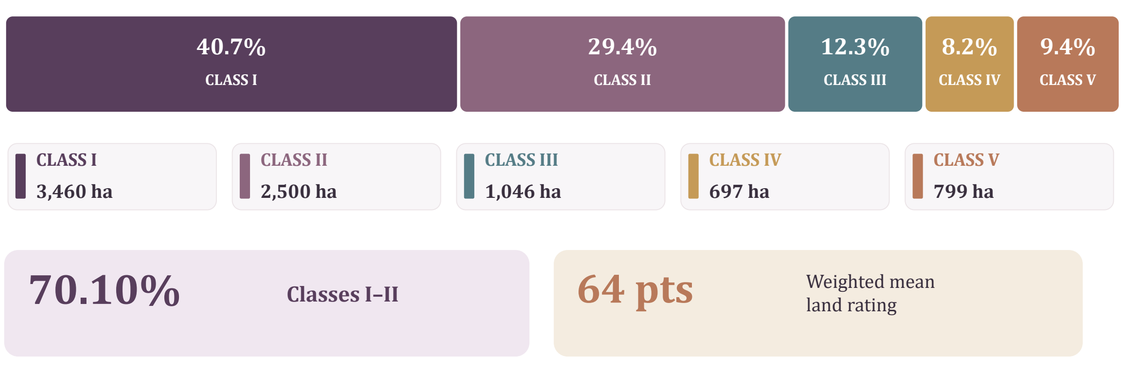
CEREAL CROPPING STRUCTURE

The 2010 census recorded 1,825.32 ha of common wheat and spelt (39.28% of cereal land), ranking second after maize (2,291.26 ha; 49.31%). Maize exceeded wheat and spelt by 465.94 ha; together, the two categories occupied 88.59% of the reference cereal area. These records demonstrate wheat’s importance in the local cropping structure, without establishing present-day allocation.

Source: 2010 Census data reproduced in Șiria Local Development Strategt (2014-2020).

ARABLE-LAND QUALITY

General quality classes I–V · 8,502-ha reference



LAND QUALITY ASSESSMENT

Classes I and II jointly comprise 5,960 ha (70.10%) of the 8,502-ha arable reference area. The reported weighted mean rating is 64 points, indicating substantial resources for general arable use. These classes are not wheat-specific suitability scores. Strong to excessive groundwater wetness affects 2,603 ha in the separate pedological reference dataset, illustrating why local site conditions remain decisive.

Source: Țărău et al. (2023)

SUSTAINABLE LAND MANAGEMENT

GROUNDWATER EXCESS

2,603 ha

Strong to excessive groundwater wetness affects 2,603 ha (21.50% of the pedological reference area). Limited aeration can impair roots and influence nitrogen transformations and losses.

SALINITY & SODICITY

LOCALIZED

Solonetz and salt-affected associations occur locally, notably near Galșa. Salinity may impede plant water uptake, while sodicity can reduce soil structural stability and infiltration.

SLOPE & EROSION

PIEDMONT

Piedmont slopes increase runoff and erosion susceptibility and complicate mechanisation. Soil-cover conservation and slope-adapted operations help limit degradation of productive land.

CONCLUSIONS

- Chernozem predominance and the high share of Classes I–II indicate favourable arable resources. Deep, well-drained lowland soils provide a suitable natural basis for wheat where water supply and aeration remain adequate.
- Suitability varies spatially: groundwater excess, locally salt-affected soils and erosion-prone slopes impose different constraints. General arable ratings are informative, but should not be interpreted as crop-specific wheat scores.
- Sustainable wheat cultivation requires site-specific water and soil management. Fertilisation should consider soil reaction, water supply and crop nutrient demand, with decisions supported by field-level agrochemical testing.

ACKNOWLEDGEMENT

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