Research Journal of Agricultural Science, 57 (4), 2025; ISSN: 2668-926X;

http://doi.org/10.59463/RJAS.2025.4.41

NATURAL RESOURCES AND AGRICULTURAL POTENTIAL FROM LUNCAVITA, CARAS-SEVERIN COUNTY

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Abstract: *The present study analyzes in detail the geographical characteristics, natural resources and agricultural potential of Luncavița commune, located in Caraș-Severin county, at the contact between the Băile Herculane Depression and the Cerna Mountains. The varied relief, composed of hilly areas, mountain meadows and forested slopes, determines a significant pedological, geological and ecological diversity, which directly influences land use and traditional agricultural practices. The research was based on the documentary analysis of pedological, geological maps and agricultural statistics, complemented by direct field observations and by correlating the data with recent climate information. Modern interdisciplinary methods were applied to evaluate soils, climatic factors and the current use of agricultural land. The predominant soils are eutricambosols, cambic chernozems and acid brown soils, developed on deluvial deposits and loessoid materials. The analysis of the land quality reveals fertile surfaces, favorable for agricultural crops, orchards and pastures, but also significant limitations, such as high acidity, excess humidity, low carrying capacity and steep slopes, which increase the risk of erosion. The temperate-continental climate with sub-Mediterranean influences, forest biodiversity, abundant water resources and local agricultural tradition support the development of mixed and sustainable agriculture. The conclusions highlight the agricultural and economic potential of the commune, offering real prospects for sustainable development, agritourism and the valorization of traditional agri-food products, while also contributing to increasing local economic competitiveness.*

Keywords: *resources, soil, agriculture, Luncavita,, factors.*

INTRODUCTION

Soils represent the upper layer of the earth's crust, the result of the complex interaction between pedogenetic factors: parent rock, climate, relief, living organisms and time. They constitute a dynamic natural system, in constant evolution, which performs essential functions for the biosphere: supporting vegetation, regulating the water and nutrient cycle, filtering pollutants and maintaining ecological balance. From an agronomic perspective, soil represents the main production resource of agriculture, and its quality directly determines the level of fertility and productivity of cultivated ecosystems.

Since soil is a limited and difficult to regenerate natural resource, knowledge of its characteristics and the processes that affect it is an essential condition for sustainable land use. Modern soil research aims not only to describe and classify soils, but also to evaluate their economic, ecological and agricultural potential.

Soil mapping is a fundamental step in soil research, allowing the identification and delimitation of soil units according to their morphological, physical and chemical characteristics. The results of mapping form the basis of soil maps and spatial planning studies, providing essential information for the rational use of soil resources.

Soil assessment aims to assess the productive value of agricultural land, by analyzing indicators such as texture, structure, humus content, soil reaction, water regime and land slope. In Luncavița commune, lands in meadow areas have high soil quality, while those located on slopes, affected by erosion and increased acidity, have a reduced productive potential.

Land quality assessment is a complex stage, intended to establish the suitability of land for different uses and to highlight soil degradation processes.

The scientific and practical importance of the work lies in providing a pedological database that can be used in agricultural, forestry and environmental protection planning activities. The results obtained contribute to understanding how natural and anthropogenic factors influence the quality of soils in the mountainous area of Luncavița commune and provide support for the implementation of sustainable measures to conserve soil resources.

MATERIALS AND METHODS

Interdisciplinary research methods were used to carry out this study, which targeted both documentary analysis and field observations. The work process was structured into several stages, each with a specific role in obtaining the necessary data.

Topographic and geological maps at different scales, made available by the Caraș-Severin Real Estate Cadastre and Advertising Office, were consulted, as well as pedological maps developed by the National Research and Development Institute for Pedology, Agrochemistry and Environmental Protection Bucharest (ICPA). These allowed the delimitation of the main relief, soil and land use units.

Statistical data provided by the National Institute of Statistics (INS), the Caraș-Severin County Directorate of Statistics and the Agency for Payments and Intervention for Agriculture (APIA) were used. This information concerned agricultural areas, crop structure, livestock and demographic dynamics of the locality. In addition, academic studies and specialized works on the physical geography of Banat Montan and the natural resources of the region were analyzed. The data obtained for Luncavița were compared with the situation in other rural localities in the Banat Montan area, such as Mehadia, Teregova and Cornereva. The purpose of this comparison was to identify similarities and differences in terms of agricultural structure, natural resources and development potential.

Climatic data (precipitation, average annual temperatures, wind regime) were taken from the reports of the National Meteorological Administration, Băile Herculane station, which covers the Luncavița area. Regarding soils, data from existing pedological studies were interpreted, which allowed the establishment of the dominant types of soils and their degree of fertility.

In the last stage, all collected data were centralized and analyzed to obtain an integrated picture of the geographical and agricultural characteristics of the area. Graphical methods were used to present the results in the form of tables and figures, which facilitate the understanding of the relationships between relief, climate, soils and agricultural potential.

By using these combined methods, the research aimed not only at a simple inventory of Luncavița's natural resources, but also at correlating them with current agricultural practices and sustainable development possibilities.

RESULTS AND DISCUSSION

Luncavița commune is located in the east of Caraș-Severin county, on the southwestern slope of the watershed called Poarta Orientală, at a distance of 4 km from the Poarta train station, on the edge of the Luncavița stream, which originates near the Semenic mountains (Loga Hill, Trăstura), 80 km from Reșița, 40 km from Caransebeș, 25 km from Băile Herculane and 8 km from E 70, consisting of the villages of Luncavita (the residence) and Verendin.

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The town of Luncavița is mentioned in documents around 1670 - 1700 as belonging to the Caransebes military circle. After the establishment of the Romanian Border Guard Battalion, in 1774, the villages of Luncavita and Verendin were incorporated into the border territory of Craina, and during the time of the Romanian - Banat Regiment, Luncavița belonged to the Teregova Border Guard Company (Iliesiu, 2011).

Being located at the contact between the Băilor Herculane Depression and the Cerna Mountains, this determines a great diversity of the landscape. The relief is presented in the form of gentle hills, mountain meadows and forested slopes. This diversity has a direct impact on land use: the depression areas are dedicated to field crops, the gentle slopes support orchards and vineyards, and the high areas are exploited through grazing and forestry.

The relief of Luncavița commune is predominantly hilly and submontane. Altitudes vary between approximately 350 and 900 meters, and the landforms are represented by deep valleys, gentle slopes and rounded interfluves. The relief was formed by the combined action of tectonic processes and erosion, being influenced by the local hydrographic network. The area offers favorable conditions for agriculture, forestry and tourism, although minor landslide processes occur in some sectors.

The territory of the locality is crossed by several streams and mountain springs, which provide drinking water resources and for irrigation. Surface waters are used mainly for watering animals and for irrigating vegetable gardens. In addition, the fishing potential is high, as the mountain streams can be arranged for trout farming.

Located on the eastern slopes of the Semenic Mountains and near the Mehadia Mountains, the Luncavița area may have calcareous parent rocks or ones with a rich limestone content, which explains the presence of the Cca horizon (carbonate accumulation).

The underground water resources, captured through wells and springs, are of good quality and provide the needs of households. Thus, water represents a competitive advantage of the area, compared to other regions of Banat Montan where access to water resources is more limited.

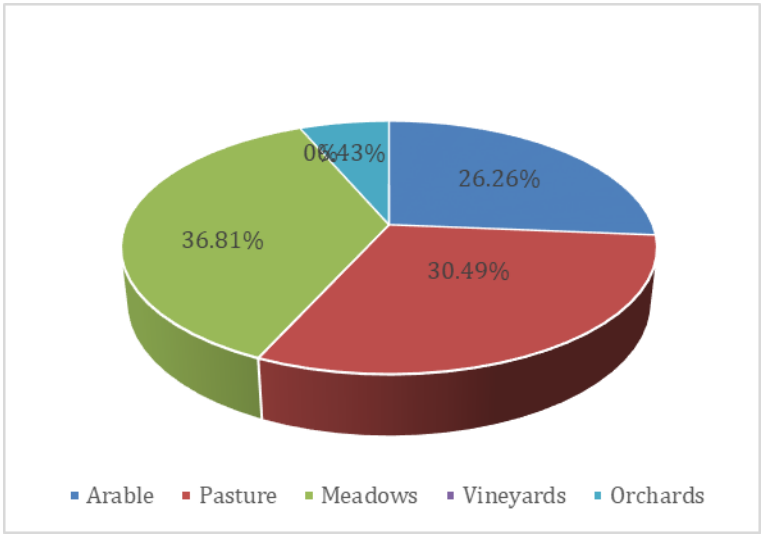

Figure 1. Land structure by agricultural use categories in Luncavița.

The perimeter of the commune, with an area of 5148 ha, of which 3998 ha (77.68%) is agricultural land and 837 ha (16.26%) is forest, is located on the Timis-Cerna corridor, on the southern edge of the Teregova platform, in a valley with a narrow outlet along the Luncavița stream, and generally presents a hilly relief open to theCerna Mountains(southeast),The Țarculu Mountains(northeast) and the Semenic Mountains (northwest).

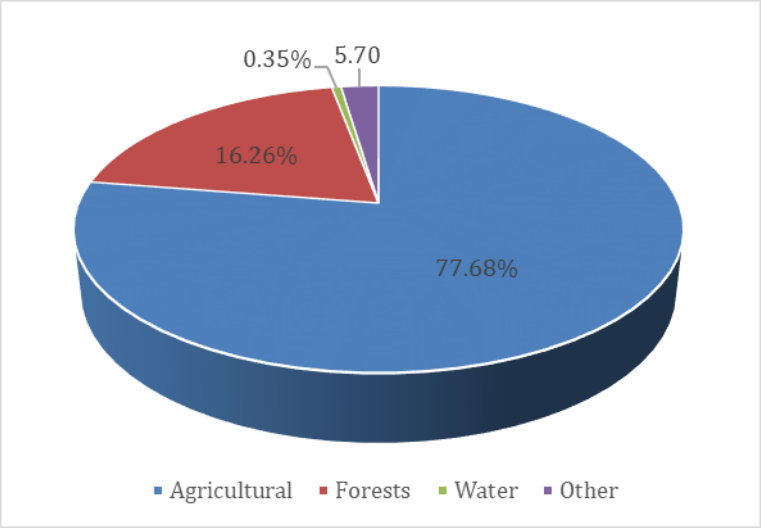

Figure 2. Land structure according to the main use categories in Luncavița

Due to its geographical position, the researched area is integrated into the temperate continental climate with sub-Mediterranean influences, the climatic subtype of the southern and southeastern Banat, characterized by the contact between the Atlantic air masses and the pressure exerted by the Mediterranean air masses, which provides a moderate character to the thermal regime, with winters and summers being short in duration, and springs and autumns being longer - temperatures are moderate at both extremes, both hot and cold. Multiannual average temperature of 10.3oC (Caransebeș), respectively 10.8oC (Băile Herculane) and multiannual average precipitation of 702.5 mm (Caransebeș station).

The characteristic vegetation of the cadastral territory is formed by beech forests with associated species such as: hornbeam, birch, oak, elm, which concentrically surround the commune.

The soils within the commune's perimeter were formed on metamorphic and sedimentary rocks, under the action of climatic and biological factors specific to the mountainous area. Within the commune of Luncavița, the main soil types identified are luvosols, districambosols, prepodzols, eutricambosols, podzols, regosols and anthrosols. They have moderate to good natural fertility, providing favorable conditions for pastures, hayfields and orchards, but also for agricultural crops on lands with low slopes.

Pedological analyses show that the soils have a high content of humus and nitrogen, which makes them very productive. However, on certain slopes, there is a risk of erosion, caused by deforestation and the use of sloping land. Therefore, sustainable agricultural practices, such as terracing or crop rotation, are essential to maintain soil fertility.

Table 1

Stagnant luvosol, dusty clay/clayey clay, Luncavita, Caraș-Severin

Horizon	M.U.	**Ao**	**El**	**EBw$_3$**	**Btw$_4$**	**Btw$_3$**	**Cn**
Depth	cm	0-14	-33	-47	-60	-100	-155
Coarse sand (2.0 - 0.2 mm)	%	6.0	4.9	4.2	3.7	3.1	2.1
Fine sand (0.2 –0.02 mm)	%	34.7	35.9	31.7	26.9	26.9	26.4
Dust (0.02 – 0.002 mm)	%	37.2	28.0	35.2	32.0	37.2	26.5
Colloidal clay (below 0.002 mm)	%	22.1	21.2	28.9	37.4	42.8	45.0
Physical clay (under 0.01 mm)	%	41.6	40.1	47.7	54.9	59.5	59.2
Textures		LP	LP	LP	tut	tut	tut
Bundle density (Yes)	g/cm3	1.31	1.39	1.45	1.47	1.49	
Specific density (Ds)	g/cm3	2.70	2.70	2.72	2.72	2.72	
Total porosity (PT)	%	51.48	48.51	46.69	45.95	45.22	
Aeration porosity (PA)	%	22.79	18.23	13.73	11.04	8.85	
Degree of settlement (GT)	%	-5.42	-0.13	6.07	10.66	13.00	
Hygroscopicity coefficient (CH)	%	5.19	4.98	6.78	8.76	10.02	
Wilting coefficient (CO)	%	7.79	7.47	10.17	13.14	15.03	
Field capacity (CC)	%	21.90	21.79	22.73	23.76	24.41	
Total capacity (CT)	%	39.29	34.81	32.20	31.26	30.35	
Useful water capacity (CU)	%	14.11	14.32	12.50	10.62	9.38	
Hydraulic conductivity (K)	mm/h	6.8	5.5	2.0	0.9	0.7	
pH in water		5.20	5.23	5.14	5.29	5.67	5.82
Humus	%	1.62	1.42	0.73	0.53		
Nitrogen index (NI)		1.00	0.78	0.48	0.41		
Humus reserves	t/ha	29.71	37.50	14.81	2.38	84.4	
Mobile phosphorus (mobile P)	ppm	16	14				
Mobile potassium (mobile K)	ppm	68	62				
Exchangeable bases (SB)	me/100	7.14	5.42	7.57	11.44	14.45	12.30
Exchangeable hydrogen (SH)	me/100	4.30	4.46	3.98	3.17	2.63	2.42
Cation exchange capacity (T)	me/100	11.44	9.88	11.65	14.61	17.08	14.72
Degree of saturation in bases (V)	%	62.41	54.85	65.52	78.30	84.58	83.57
Mobile aluminum	me/100	0.59	0.74	1.13	0.85	0.60	

- the texture is dusty loam between 0-47 cm, medium clayey loam between 47-155 cm;
- total porosity is high between 0-33 cm, medium between 33-47 cm, low between 47-100 cm;
- the apparent density is low between 0-33 cm, medium between 33-47 cm, high between 47-100 cm;
- low wilting coefficient between 0-33 cm, medium between 33-47 cm, high between 47-100 cm;
- the field capacity is medium between 0-100 cm;
- the soil reaction is moderately acidic between 0-155 cm;
- the humus reserve in the first 50 cm is small;
- the nitrogen index is low between 0-60 cm;
- the content of assimilable P in Ap shows a poor supply status;
- the assimilable K content in Ap shows an average supply status.

They reflect, through their geobiochemical and morphological properties, the main defining and determining characteristics for the growth and fruiting of the main cultivated

http://doi.org/10.59463/RJAS.2025.4.41

plants, expressed through quality grades, based on which the lands were classified into quality classes, from I to V for the arable area and the pasture area, respectively. The soil reaction is neutral to slightly alkaline, and the high humus content confers a high natural fertility, specific to forest-steppe and hilly pasture areas.

Table 2

Land quality classes from Luncavita (ha)

Use category	Class I	Class II	Class III	Class IV	Class V
Arable	0	0	348	478	226
Pasture	0	120	524	450	125
Meadows	0	120	740	380	230

The soil reaction analysis revealed a pronounced degree of acidity over most of the studied area. The distribution indicated that 65.65% of the area falls into the strongly acidic category, while 16.30% is moderately acidic and only 13.60% is weakly acidic. This high acidity constitutes a major limiting factor for agricultural productivity, affecting the availability of essential nutrients, such as phosphorus, and favoring aluminum toxicity.

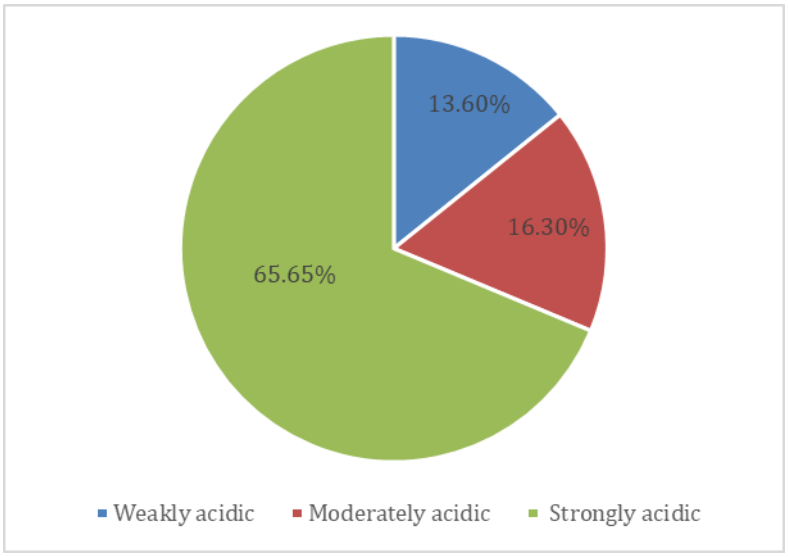

Figure 3. Distribution of soil reaction in Luncavita.

Regarding the water regime, excess surface moisture was identified on a significant part of the land. It was classified as strong on 10.20% of the surface, moderate on 12.60% and reduced on 19.30%. These conditions can negatively affect the soil structure, leading to root asphyxiation and making access for agricultural machinery difficult during certain periods of the year.

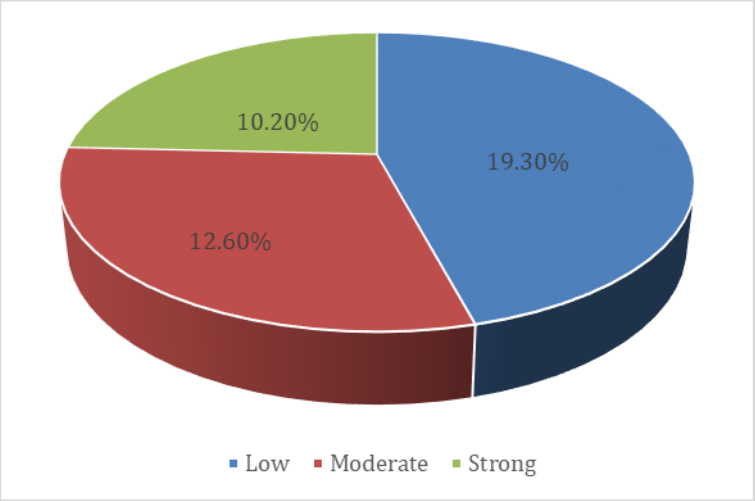

Figure 4. Areas affected by excess surface moisture in Luncavita.

The bearing capacity of the land, essential for the optimal performance of agricultural works, is deficient over a large part of the area. It was found that 71.79% of the land has a temporarily unsatisfactory bearing capacity, which indicates an increased sensitivity to subsidence, especially after rainfall. Poor bearing capacity was recorded on 10.60% of the area, while a moderate level was found on 18.60%.

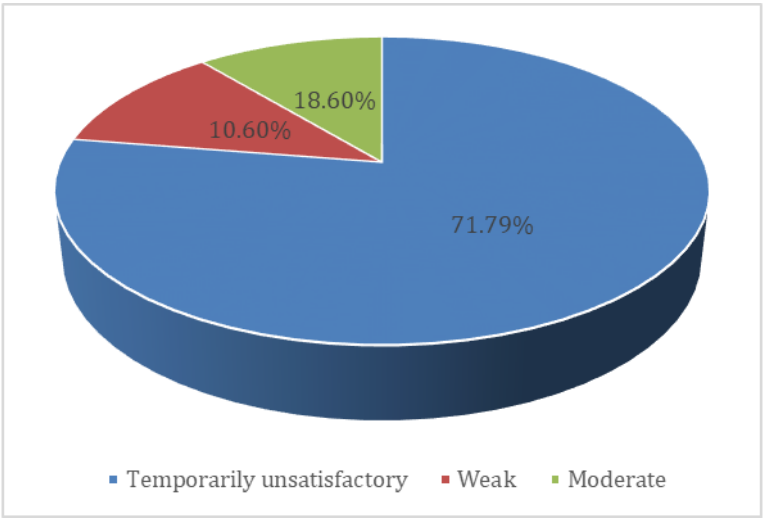

Figure 5. Land bearing capacity in Luncavita.

The rugged terrain is another limiting factor, with the slope of the land having a significant contribution to the risk of erosion. A percentage of 39.50% of the studied area has slopes ranging between 5.1 and 35.0%, with areas exceeding 45.10%. These slopes severely limit the mechanized use of the land and require the implementation of anti-erosion measures.

Drainage and agro-pedo improvement works are necessary on these lands to combat excess of moisture, prevent and combat soil erosion and improve plant nutrition conditions through periodic calcium amendment and ameliorative fertilization, improve the aerohydric regime of the soil by introducing ameliorative crops, mixtures of perennial grasses and legumes, etc.

The agricultural tradition of Luncavița is based on a diversified crop structure. The most important are fodder plants, mainly represented by clover and alfalfa, vegetable crops such as tomatoes, onions, cabbage, peppers, carrots, beans and sweet corn, as well as potato, corn, wheat and triticale crops.

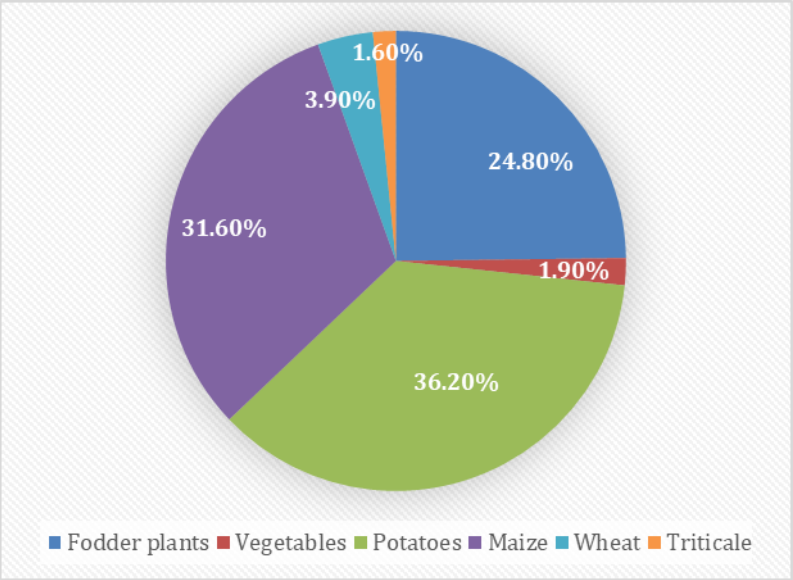

Figure 6. Structure of crop areas in Luncavita.

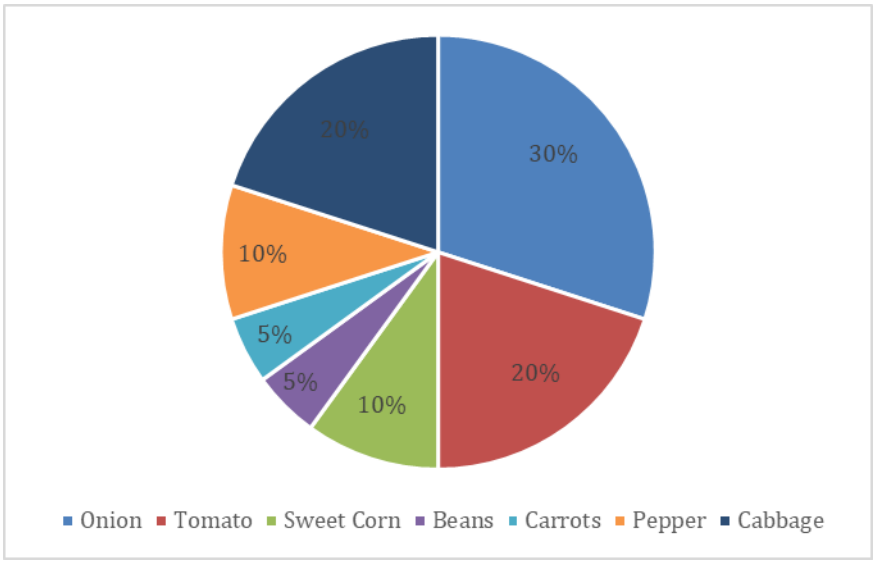

Figure 7. Detailed structure of vegetables in the crop area of Luncavita.

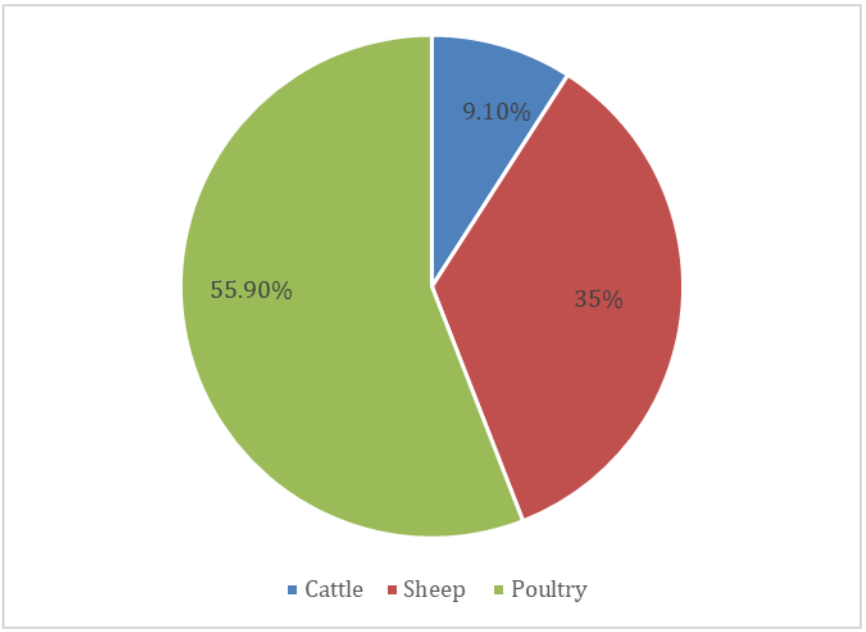

Figure 8. Structure of livestock in Luncavita

In recent years, a trend of diversification has been noted through the introduction of higher value-added crops, such as aromatic and medicinal plants, grown in small-scale farms.

Animal husbandry is an essential component of the local economy. Cattle and sheep breeding is supported by the existence of extensive pastures and natural meadows. Dairy products (milk, cheese, curd, curd) are consumed mainly in households, but some are also sold on the local market.

Poultry farming and poultry farming are practiced in family households, mainly for self-consumption. In contrast, beekeeping has gained ground in recent years, thanks to the rich and diverse flora of the area, which provides quality nectar for honey production.

CONCLUSIONS

The study conducted on the Luncavița locality confirms the existence of natural conditions favorable to the development of agriculture. The varied relief, fertile soils, temperate climate with sub-Mediterranean influences and water resources are determining factors for the diversification of crops and the practice of animal husbandry.

Research results show that it has a mixed agricultural structure, in which field crops are combined with fruit growing, viticulture and animal husbandry. In addition, the forest resources and biodiversity of the area offer opportunities for the development of agritourism and related economic activities.

In the medium and long term, the local community can benefit from the modernization of agricultural infrastructure, the valorization of traditional products and the attraction of investments in rural tourism. These directions can transform Luncavița into a model of sustainable development for the entire Banat Mountain region.

Luncavița commune has natural conditions favorable to agriculture: soils with moderate-good fertility, temperate climate with sub-Mediterranean influences, rich water resources and extensive areas of pastures and hayfields.

The soils have a high diversity, but over 65% of the surface is strongly acidic, requiring calcareous amendments and ameliorative fertilization to increase agricultural productivity.

The major limiting factors are: excess moisture, poor soil bearing capacity, steep slopes and the risk of erosion, which requires drainage works, terracing and the practice of conservative agriculture.

The agricultural structure of the locality is mixed, combining field crops with fruit growing, viticulture, animal husbandry and beekeeping, which ensures the resilience of the local agricultural system.

Natural resources (forests, mountain ecosystems, rural landscapes) and cultural heritage offer opportunities for the development of agritourism, ecotourism and for the promotion of traditional products (honey, dairy products, brandy, wine).

In the future, it is necessary to modernize agricultural infrastructure, use sustainable technologies, diversify crops, and attract investments, so that Luncavița becomes a model of sustainable rural development in Banat Montan.

In conclusion, the study of soils and lands in Luncavița commune has great scientific and practical importance, providing a solid basis for the sustainable use of soil resources, environmental protection and balanced development of agricultural and forestry activities in this mountainous area.

BIBLIOGRAPHY

BADEA, L. (2012). Geografia României, vol. V – Banatul și Crișana. Editura Academiei Române, București.

BĂLTEANU, D. (2011). Agricultura și spațiul rural în România. Editura Academiei Române, București.

DICU D., R BERTICI, M HERBEI,F SALA, 2024, Variability of pastures based on soil quality indices., Applied Ecology & Environmental Research, vol 21, no. 6

DORNIK A., MARINELA ADRIANA CHEȚAN, DRĂGUȚ L., DICU D.,ILIUȚĂ A., 2022, Optimal scaling of predictors for digital mapping of soil properties, Geoderma, Vol. 405, Elsevier

DORNIK ANDREI, MARINELA ADRIANA CHEȚAN, LUCIAN DRĂGUȚ, ANDREI ILIUȚĂ, DANIEL DORIN DICU, 2022, Importance of the mapping unit on the land suitability assessment for agriculture, Computers and Electronics in Agriculture, vol. 201, Ed. Elsevier

MIHAILESCU, V. (2010). Resursele naturale și utilizarea lor. Editura Academiei Române, București.

POPESCU, I. (2015). Geografia fizică a României. Editura Universitară, București.

POSEA, G. (2006). Geomorfologia României. Editura Fundației România de Mâine, București.

TEACI, D. (1980). Bonitarea terenurilor agricole. Editura Ceres, București.

ȚĂRĂU, D., ROGOBETE, GH., & DICU, D. (2018). Solurile din sud-vestul României. Editura Eurobit, Timișoara.

ȚĂRĂU, D., DICU, D. D., NIȚĂ, L. D., TUDOR, C. M., ROGOBETE, GH., GROZAV, A., ILUȚĂ, A. Ș., & BERTICI, R. (2019). Pământuri și locuri dintre Dunăre – Vârful Gugu – Crișu Negru. Editura Eurobit, Timișoara.

UJVÁRI, I. (1972). Geografia apelor din România. Editura Științifică, București.

***CONSILIUL JUDEȚEAN CARAȘ-SEVERIN (2021). Studiu de cercetare transfrontalier. Document care poate include hărți și analize despre excesul de umiditate în județ, inclusiv date de la ICPA.

***DIRECȚIA JUDEȚEANĂ DE STATISTICĂ CARAȘ-SEVERIN (2022). Raport privind agricultura județului Caraș-Severin.

***EUROPEAN ENVIRONMENT AGENCY (2020). Sustainable Land Management in Rural Areas.

***FAO – FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (2015). World Reference Base for Soil Resources.

***INSTITUTUL NAȚIONAL DE STATISTICĂ (2023). Anuarul Statistic al României. Date statistice privind județul Caraș-Severin.

***ICPA (2021). Studii pedologice și hărți de sol pentru județul Caraș-Severin.

***PRIMARIA COMUNEI LUNCAVIȚA (2024). Raport local de dezvoltare rurală.