

EXPERIMENTAL MODEL EVALUATION ON AGRICULTURAL LAND

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***Abstract:** To estimate the market value of agricultural land was used in this experimental model the profit based method of determining the value of land. It is one of the methods that reveals the exact value of agricultural land in Romania, but depends on the accuracy of the processed data, resulting from compliance of the factors which determine agricultural production in relation with the biology of plants.*

For experimental model, necessary for agricultural land evaluation, we used digital cadastral plan and plan layout analog ground units to the North-West of unincorporated area Țuțora, Iasi. The acquisition, processing and analysis of the experimental data base of information system of agricultural land covered an area of 405.17 ha, which was mapped 10 soil mapping units.

***Key words:** soil survey, agricultural lands, economical assessment*

INTRODUCTION

This paper presents aspects on achieving valuation of agricultural land using the methodology in Romania the main uses and crops. Economic evaluation of agricultural land is an essential activity of management of land resources in terms of a functioning market economy.

Through the studies mapping and soil evaluation marks resulting graphs and descriptive database required for inventory, classification and evaluation of soil resources a geographic area.

MATERIAL AND METHODS

In terms of principle presented materials and method used in this study case, for which has compiled a database used to support the integrated management of soil resources and agricultural land.

For the study case of the experimental model were selected **sectors cadastral** with numbers: **4/1; 5/1; 6/1; 7/1; 8/1; 11/1** within the administrative territory of **unincorporated area Țuțora (figure 1)**. From geomorphological area under study falls in the Moldavian Plain, ranging in common plain of the two rivers, Jijia and Prut, on the left side Jijiei flowing close to the studied area, detaching it from the west. The minimum height of the land is 33.8 m in the south and the maximum altitude is 35.9 m in the north. Prevailing altitudes are between 34 and 35 m in the central.

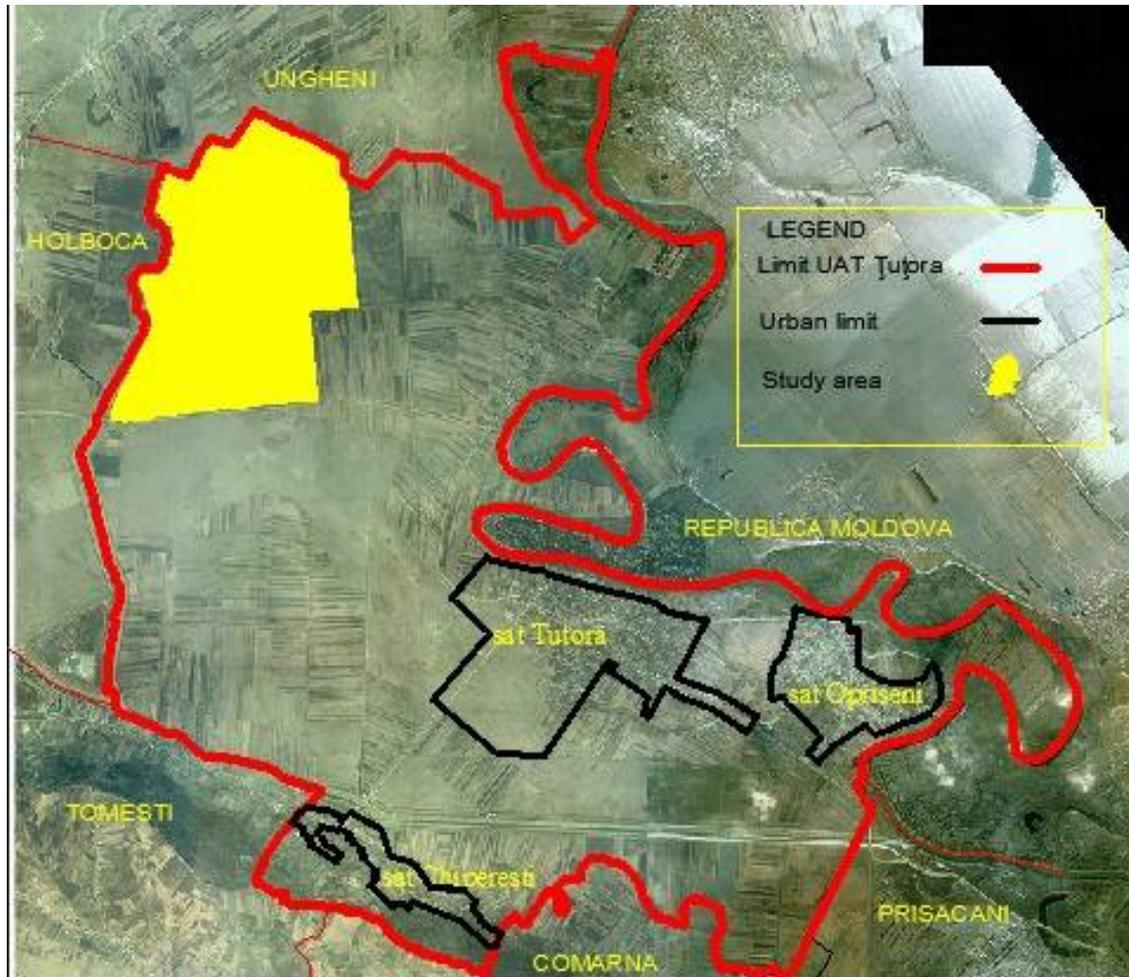


Figure 1 - Position the North-West of unincorporated area Țuțora, Iasi

Throughout meet studied surface drainage channels oriented from north to south, and the distance between them is 400 and 500 m. In the south is a main channel that drains the secondary drainage channels, orientation of the east to west. As a positive form of microrelief stated that seeks river dam Jijia that protects land from flooding caused by the great flood.

For experimental model, required in evaluating agricultural land, I used digital cadastral plan (figure 2) and plan layout analog ground units to the North-West of unincorporated area Țuțora, Iasi.

Pedological study of agricultural land to the North-West of unincorporated area Țuțora, was executed in 1997 the OSPA Iasi, according to the Methodology of development of soil studies in 1987. The soil mapping work, covering the entire set of observations, field studies, laboratory and office is achieved, on the one hand, both the description and classification of soil profiles, and drawing maps of soils boundaries soil map unit. To use the case study was carried description and characterization of the soil characteristics of the **10 units** that were mapped, to the North-West of unincorporated area Țuțora, to economic evaluation (figure 3).

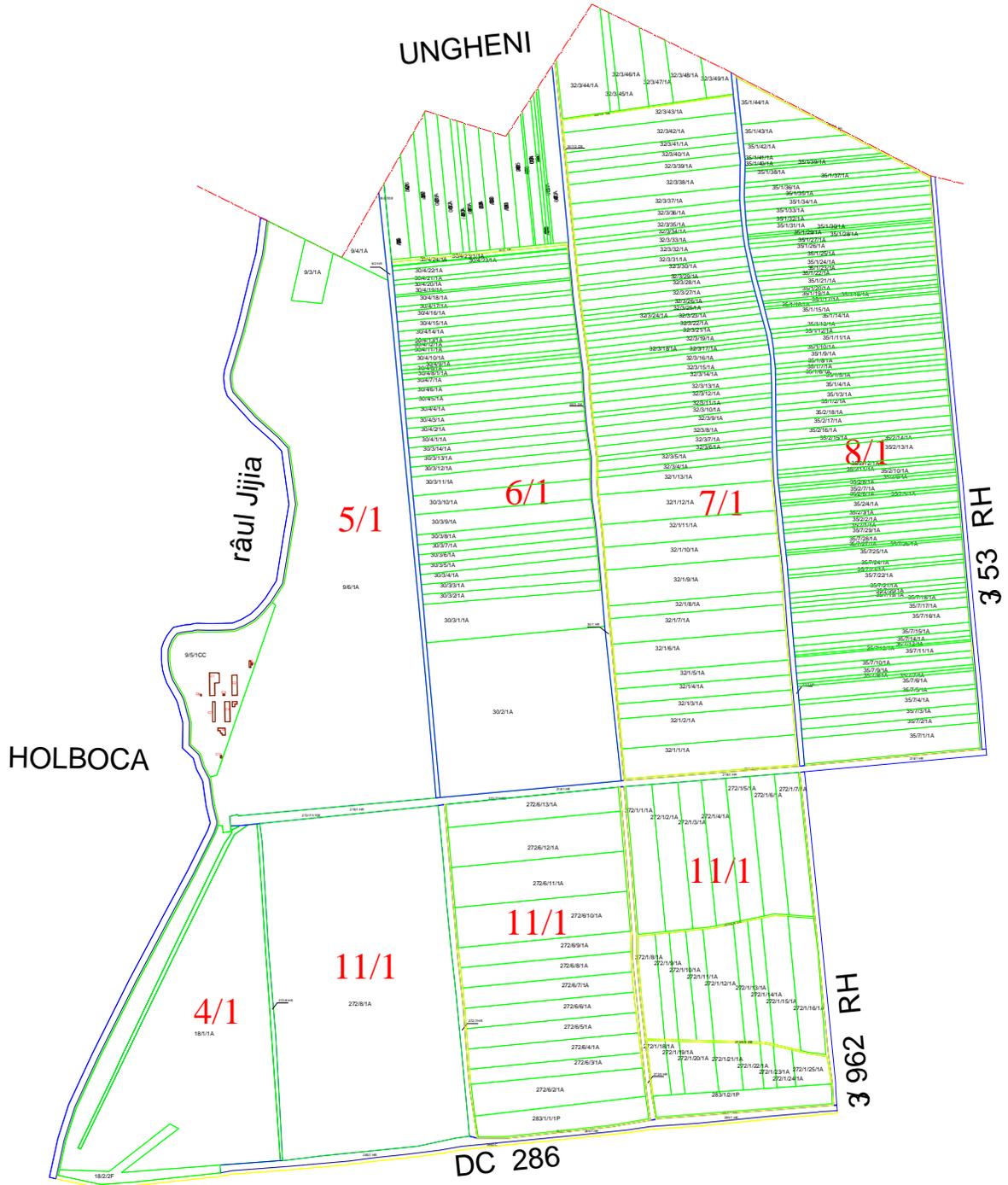
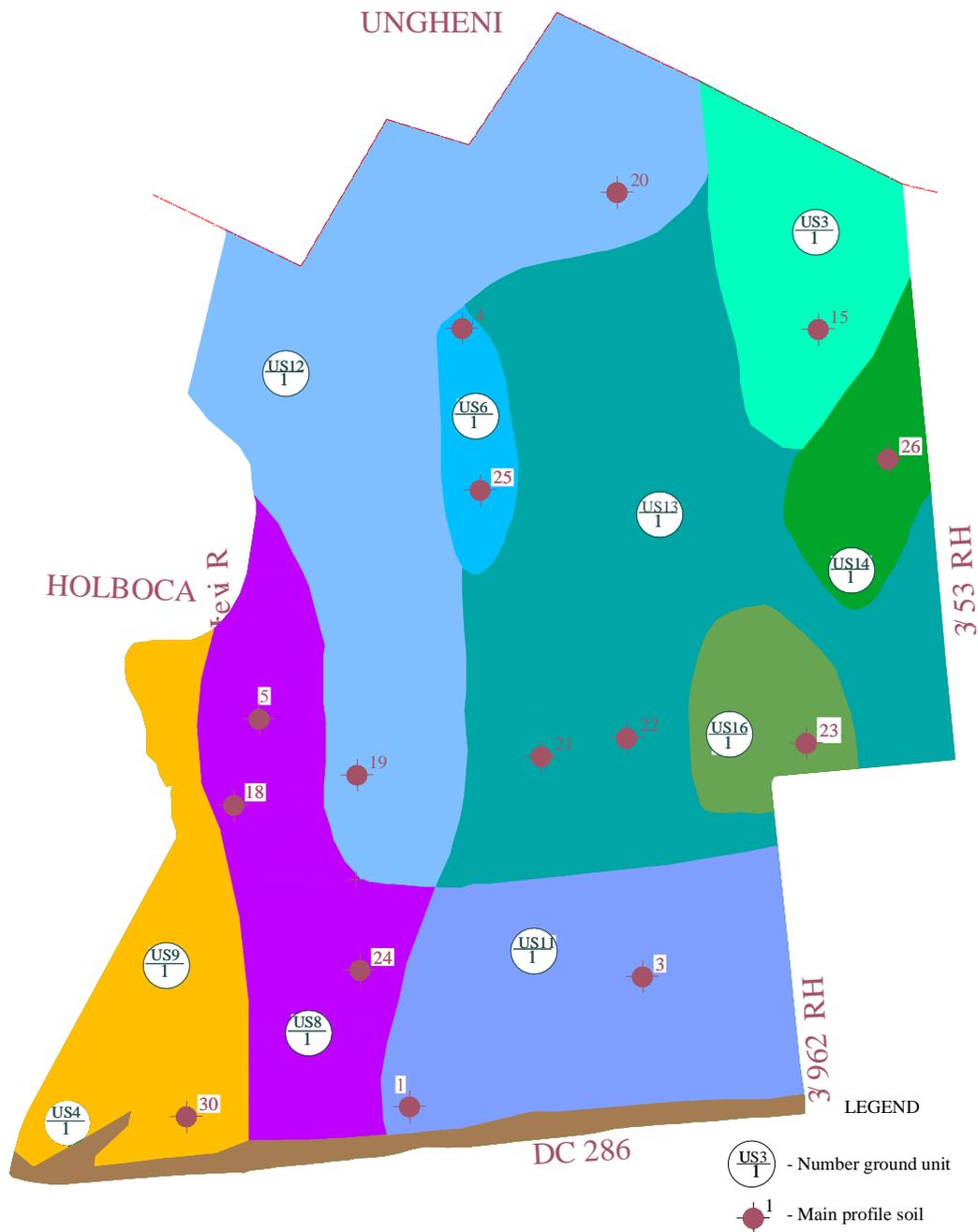


Figure 2 – Cadastral plan to the North-West of unincorporated area Țuțora



Color	Number ground unit	Name	Formula
	US 8	Aluvisol molic	AS mo
	US 9	Aluvisol gleic molic	AS gc mo
	US11	Aluvisol gleic molic, low salinity	AS gc mo s2d3
	US12	Aluvisol molic gleic salinity, low salinity	AS mo gc sc s2d1
	US13	Aluvisol gleic molic salinity, low salinity	AS gc mo sc s2d3
	US14	Aluvisol molic gleic salinity, low salinity	AS gc mo sc s2d1
	US16	Aluvisol salinity, moderate salinity	AS sc s2d2
	US 3	Chernozem gleic salinity, low salinity	CZ gc sc s2d3
	US 6	Chernozem gleic salinity, strong salinity	CZ gc sc s2d3
	US 4	Gley cernic	GS ce

Figure 3 - Map of soil units (US) of the North-West of unincorporated area Țuțora

Evaluation notes the calculation of the **10 soil units** was performed for the following four crops: **alfalfa (LU), barley (OR), corn (PB), wheat (GR)**, considered representative of the natural of the North-West of unincorporated area Țuțora. For the category of natural quality index these arable (A) use the arithmetic mean of evaluation marks for the four crops range greatest when the territory studied (**table 1**).

Table 1 Notes the units of evaluation of soil and crops

Nr. US	Surface (ha)	Cultures				Use
		LU	OR	PB	GR	A
3	27.55	45	45	40	50	45
4	9.98	3.2	3.2	3.5	3.6	3.4
6	9.22	45	50	44	58	49
8	43.56	70	70	63	80	71
9	32.64	81	90	90	90	88
11	52.69	52	64	45	72	58
12	96.70	52	52	45	58	52
13	103.65	46	58	45	65	53
14	14.98	50	56	44	64	54
16	14.20	45	50	40	58	48

Based on evaluation marks obtained on ground units (US) and the four crops (LU, OR, PB, GR) was performed territories framing homogeneous ecological **quality classes** suitable for arable land use (**table 2**).

Table 2 Classification of land quality classes for arable use

Quality class / Points evaluation marks	Note of evaluation the U.S. (points)	Soil unit		
		Nr. US	Surface (ha)	Surface (%)
I/81-100	88	9	32,64	8,0
II/61-80	71	8	43,56	10,7
III/41-60	45	3	27,55	6,8
	49	6	9,22	2,3
	58	11	52,69	13,0
	52	12	96,70	23,9
	53	13	103,65	25,6
	54	14	14,98	3,7
	48	16	14,20	3,5
IV/21-40	-	-	-	-
V/1-20	3,4	4	9,98	2,5
TOTAL AREA		-	405,17	100,0

Based on calculation sheets evaluation notes the **10 units of soil** thematic map was drawn on their classification into quality classes (**figure 4**).

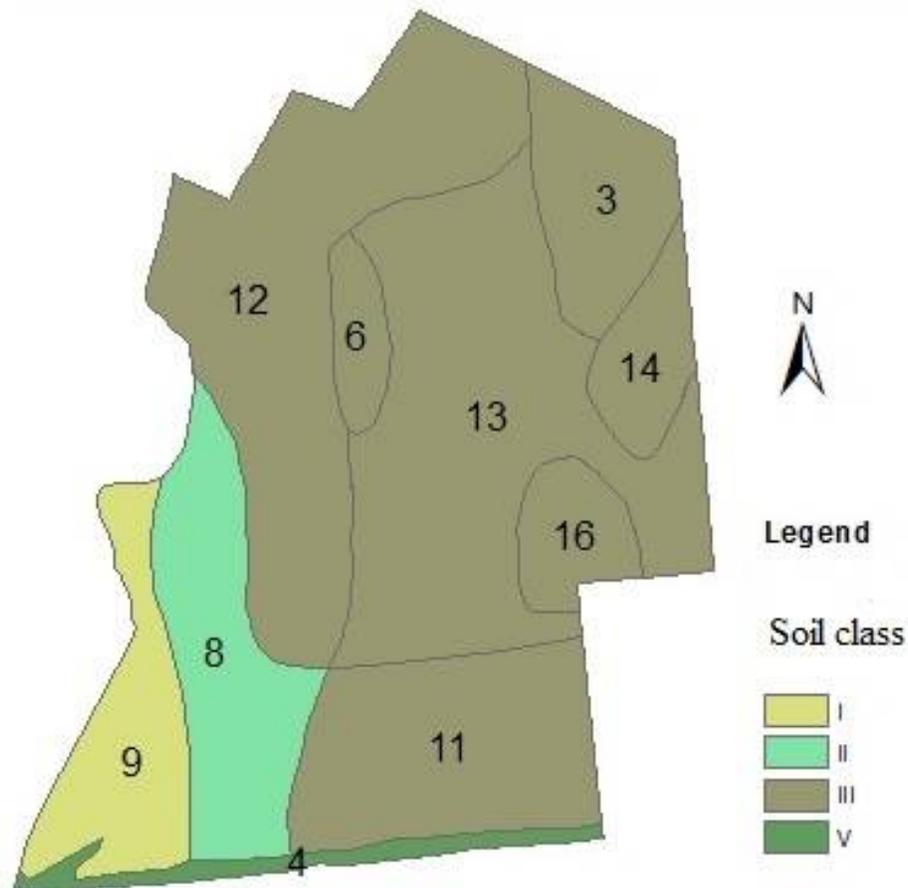


Figure 4 - The distribution of soil quality classes

It can be seen from the map on the distribution of soil units graded (Figure 4) that US ground **unit 9** was included **in the first grade quality** (81-100 points), and US ground **unit 4** **in the fifth grade of quality** (0-20 points). First grade quality land with an area of **32.64 ha** which represents an **8%** of mapped area having a good suitability for use with low soil limitations for agriculture. Land included in the second class quality have an area of **43.56 ha**, ie a rate of **10.7%**. **Only a small area of land** is occupied land **2.5% of fifth grade quality**.

In a market economy, land is valued, which means that agricultural land will have a price. At the price of agricultural land is its note of evaluation which was obtained either use that, either by its value for a given culture.

Average rating of evaluation for the use of arable and maize were obtained by weighted average, taking into account the area of arable land use category in each unit of evaluation notes the soil and arable and corn.

The data presented in **table 3** is observed that most of the arable area (**305.86 ha**) of land is occupied **class III quality** with average grade of evaluation on arable **56 points**. For corn the average score of evaluation was **49 points** which falls this profitable crop near the limit of **50 points** (**table 3**).

Table 3 Classification of soil units (US) in graded as grade of evaluation and score for corn in arable use

Nr. US	GRADE														
	I			II			III			IV			V		
	ha	NB	PB	ha	NB	PB	ha	NB	PB	ha	NB	PB	ha	NB	PB
3	-	-	-	-	-	-	25.52	45	40	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-	-	-	5.65	3.4	3.5
6	-	-	-	-	-	-	9.22	49	44	-	-	-	-	-	-
8	-	-	-	41.95	71	63	-	-	-	-	-	-	-	-	-
9	27.48	88	90	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	48.19	58	45	-	-	-	-	-	-
12	-	-	-	-	-	-	94.08	52	45	-	-	-	-	-	-
13	-	-	-	-	-	-	100.39	53	45	-	-	-	-	-	-
14	-	-	-	-	-	-	14.97	54	44	-	-	-	-	-	-
16	-	-	-	-	-	-	13.45	48	40	-	-	-	-	-	-
TOTAL	27.48	88	90	41.95	71	63	305.86	53	44	-	-	-	5.65	3.4	3.5
Grade/ NB general average/ arable (A)/ corn (PB): III/ 56 (A)/ 49 (PB)															

Depending on the harvest and investments (cost of production), a certain field can create or add value. The determining factor for achieving profitability is the suitability of that land for plants. Also, there are culture technology applied, the degree of mechanization, market outlets.

Economic evaluation of agricultural land is an essential activity of management of land resources in terms of a functioning market economy. Experiments conducted over 20 years in reference parcels located in areas of Romania's soil and climate on agricultural production led to the establishment of evaluation point values expressed in kg / ha produced the main crops. These values vary over time as they are determined by the level of applied technologies. Natural value evaluation notes at one point expresses the photosynthetic capacity of crops.

For approval "Methodological norms for calculating indicative of rent" (Law no. 16/1994) was issued MAA Order No.26 / 1994 which shows that the minimum and maximum potential output is determined by the contractual parties in wheat, considered as reference product . The value of a point of evaluation for wheat was considered at that time as 40 kg (table 4).

Table 4 Equivalent in the point of evaluation products

Equivalent in the point of evaluation products	CULTURES		
	Wheat	Barley	Corn
Kg / point	40	45	52

Land evaluation method based on profit (net income) used values that are equivalent in agricultural products of point evaluation for main crops.

The production capacity of the land is a qualitative expression of the manifestation of all the factors of vegetation conjugate, expressed through production measured in **kg / ha**.

National Research and Development Institute for Soil Science, Agrochemistry and Environment Protection Bucharest and update currently national system for monitoring soil-land for agriculture (Ministry of Agriculture no. 278/2011).

Profit based economic value of land located in the unincorporated area of guardians expressed in terms of value of production minus the production costs, considering the number of years of use of land. **Law no. 18/1991** stipulates in Chapter 7, Article 92, paragraph 4, with reference to Annex 1, the price movement of the land is given by the nominal amount of movement that is calculated by multiplying annual income by **25 years**. To this end the following formula is used:

$$V_t = [V_p - (C_p + K_1 + K_2 + K_3 + K_4 + K_5)] \times 25$$

where: V_t - the amount of buildable land in lei / ha;

V_p - production value;

C_p - production overheads (primary + secondary + increases in technological efficiency);

K_1 - coefficient which adds to production costs for land with slopes greater than 5% ($K_1 = 5\%$ of C_p);

K_2 - coefficient which adds to production costs for land with slopes greater than 12% ($K_2 = 10\%$ C_p)

K_3 - coefficient which adds to production costs depending on distance from the city (each 1% of C_p for each extra km over the limit of 2 km from the edge of the built) considered for the calculation of net income;

K_4 - coefficient which adds to production costs that depend on the access path (5% of C_p for lands that are not bordered by a modernized road that is passable in all seasons);

K_5 - coefficient which adds to production costs for land having slopes over 6% and the longest side with a length of less than 300 m (5% C_p);

25 - number of years the farm.

To determine the value of production per hectare must be known note of evaluation for that land, equivalent to products of point of evaluation for corn (kg corn / point evaluation marks) and corn price recovery.

The production value per hectare is calculated as:

$$V_p = NB \cdot \text{kg/point evaluation marks} \cdot \text{price lei/kg}$$

Where: **NB** - note of evaluation for corn;

kg / point evaluation marks - equivalent in agricultural products of a point of evaluation in accordance with Annex 1 of MAAP Order no. 26/1994 (**corn have 52 kg / point**);

Recovery price (lei / kg) is considered the current **0.8 lei / kg** corn.

For the area of the North-West of unincorporated area Țuțora evaluation was carried out for the use of arable land in the four classes of quality that emerged from the study of evaluation.

For arable land class III quality, occupying the largest area (**305.86 ha** of arable land) in **table 3** have an average evaluation marks of **53 points** (arable) and **44 points** (corn).

The production value per hectare was determined by the relation of the form:

$$V_p = NB \text{ (corn)} \cdot \text{kg/point} \cdot \text{price (kg)} = 44 \times 52 \times 0,8 = 1\,830,4 \text{ lei/ha}$$

Overheads production represents 85% of production value (V_p)

$$C_p = 1830.4 \text{ lei / ha} \cdot 85\% = 1555.8 \text{ lei / ha}$$

Land value in grade III (41-60 points of evaluation) is obtained by the expression:

$$V_t = (1\,830,4 - 1\,555,8) \text{ lei/ha} \times 25 = 6\,864 \text{ lei/ha}$$

The method for calculating the land-based profit (net income), the result most expensive farmland (first class quality) for the area of the North-West of unincorporated area Țuțora costs 14 040 lei / ha, the cheapest (grade) costs 546 lei / ha, and the average value of farmland is 7622 lei / ha (**figure 5**).

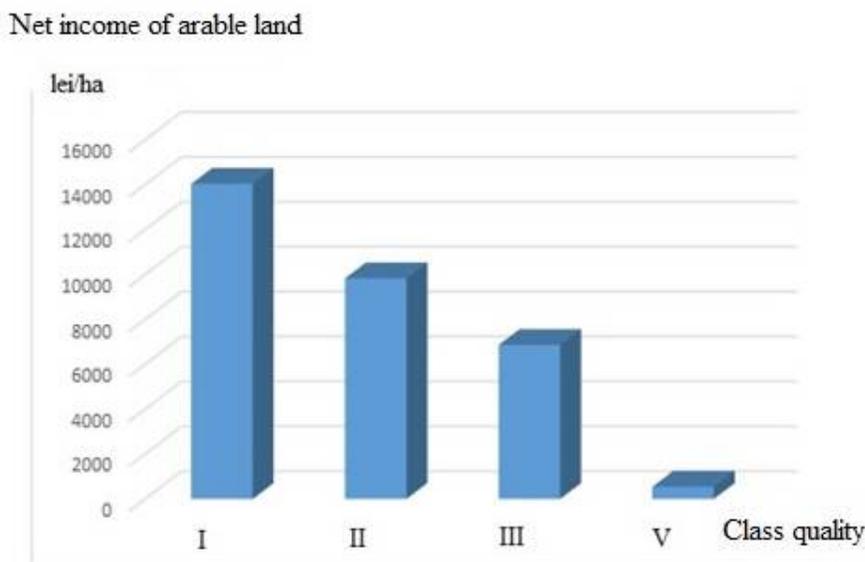


Figure 5 - Graph representing the net income of arable land

Similarly expressed the value of land and other quality classes (**table 5**), based on data in **table 3**.

Table 5 Economic evaluation of the use of arable based on net income

CLASS QUALITY										Weighted average	
I		II		III		IV		V		TOTAL ARABLE	
Area	Value	Area	Value	Area	Value	Area	Value	Area	Value	Area	Value
(ha)	(lei/ha)	(ha)	(lei/ha)	(ha)	(lei/ha)	(ha)	(lei/ha)	(ha)	(lei/ha)	(ha)	(lei/ha)
27.4810	14040	41.9524	9828	305.8604	6864	-	-	5.2541	546	380.5480	7622

CONCLUSIONS

By making the information system of agricultural land, creating the conditions necessary to establish uniform quality elements of land valuation in order to determine taxes and optimizing land use. The quality of the cadastre help ensure necessary information and solve a multitude of problems on public and private agricultural lands.

Cadastral tasks require the assessment of quality agricultural land, based on bonității natural conditions and / or enhanced. Evaluation notes are relevant only for comparing land over the same culture / use. Economic evaluation of agricultural land is required, with a degree of confidence higher than the same note as the note of evaluation of evaluation correspond to very different tax for different crops / uses, the same profit that corresponds to solvency notes very different for different cultures / uses.

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