

## RESEARCH REGARDING LAND EVOLUTION AND AGRICULTURAL AREA OF GALATI COUNTY

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### *Abstract*

*Agricultural land is distributed on farms of different types and legal forms, which differ depending on the size of the resources held. The result of agricultural production depends on the volume of resources, although the low degree of investment concentration, in the case of family farms, complicates the exploitation process. A general analysis of the structure of vegetable production in Galati County has highlighted a number of deficiencies in recent years, which have created distortions between local demand and supply of agricultural products. In Galati County there have been changes in the structure of crops, with the decrease of the share of cereals and the increase of areas for peas and sunflowers. The research results showed that there were certain structural imbalances related to the supply of agricultural raw materials to the local processing sector. These researches are part of a complex study, which aims to optimize agricultural production in the Galati area and increase the competitiveness of the national agricultural sector.*

*Key words: production structure, agriculture, agricultural production.*

### INTRODUCTION

Given that, in Romania, rural areas occupy almost 90% of the territory and have about 50% of the total population, to achieve a real picture of agricultural development, it is necessary an analysis aimed at the evolution of land structure and especially of the structure of arable land, in order to identify trends and their medium and long-term effects.

The change in the type of ownership of agricultural land and the formation of a new organization of agricultural producers, have generated excessive fragmentation of agricultural land, the formation of a large number of individual farms, subsistence, a restriction of productive services for agriculture (irrigation, fertilization, mechanization, etc.) and a significant depreciation of the productive quality of the lands (Nicula et al., 2019).

Romania has an important land wealth, 63.3% of the country's surface has an agricultural destination and it is structured on categories of use (arable, pastures and hayfields, vineyards and orchards), being influenced by natural factors but also economic and social-historical

factors (people's needs and concerns, tradition, etc.). The evolution of agricultural productions is closely related to the changes that have taken place in the ownership structure of the land fund and of the other means of production, as well as of the climatic variability (Nicula & Stanciu, 2018).

The predominantly cereal character of the production structure represents a negative aspect of the Romanian agriculture.

The share of agricultural area filled with grain is high, even if the cultures don't have very favorable agro-climatic conditions for the development of those species.

The decision regarding the elaboration of the crop structure, in order to achieve an efficient crop rotation, aims for a number of main crops to be established in accordance with the occupation of the arable surface of the farm, respecting the size restrictions, production costs, and labor.

Determination of the crop rotation is achieved using mathematical and economic methods in which the weight of each total area of cultivated crops, is based on the optimality criteria of the chosen variant.

## MATERIALS AND METHODS

The material that formed the basis of this paper is information obtained by the usual means, namely: newsletters, statistical yearbooks, statistical briefs. The research methods used in this study are: basic research (pure or basic) and evaluative research.

The preliminary documentation aimed to identify and study the general information sources and, subsequently, the specific information sources, in order to determine the characteristics of the researched area. For this purpose, the databases and statistical bulletins of the National Institute of Statistics of Romania were consulted, in order to observe the time series of some indicators relevant for research, as well as data provided by the County Directorate of Statistics.

## RESULTS AND DISCUSSIONS

In order to highlight the most significant aspects regarding the evolution of agriculture in Galati County, the following indicators were used:

- the *structure of the land fund*;
- the *structure of the arable land on groups of crops and cultures*.

The study analysed these indicators both in dynamics and in territorial profile. For these indicators, the analysis referred to the results obtained in Galati County. As it can be seen, from the data presented in Table 1 in 2014, agricultural area of Galati County is estimated at 358.31 thousand ha, of which 292.92 ha arable land (81.75% of the total).

Table 1. The structure of the agricultural land in Galati County, by categories of use and owners, in 2014

Category of land	Total county (ha)	% of agricultural	Private sector (ha)	% of the total county	Public sector (ha)	% of the total county
Arable	292.926	81.75	290,979.48	99.34	1946.52	0.66
Pastures	43.612	12.17	18656.30	42.78	24955.70	57.22
Grasslands	656	0.18	52	7.93	604	92.07
Vineyards	19.397	5.41	18648.22	96.14	748.78	3.86
Orchards	1720	0.48	1702	98.95	18	1.05
<b>Agricultural - total</b>	<b>358.311</b>	<b>100.00</b>	<b>330.038</b>	<b>92.11</b>	<b>28.273</b>	<b>7.89</b>

Source: data processed by the GALAȚI County Directorate of Statistics.

NOTE: Fund land by way of use, county, is the land of the property owners in radius administration, until the completion of the action of cadaster of land made by the National Agency of Cadastral and Real estate Advertising; data series are blocked at the level of 2014.

Analysing the structure of the agricultural land, by the owner of the area, from the total agricultural area of Galati county, 92.11% is private property, whereas the private sector owns 99.34% of the arable land. The sector with state majority, has only a percentage of 7.89% of agriculture area and only 0.66% of the total area of arable land. In Galati County, the private sector holds 42.78% of the area of

pastures, 96.14% of the area of vineyards, 98.95% of orchards. Regarding the evolution of the structure of agricultural land by categories of use in Galati county (Table 2), it results that in the period 2010-2014, the total agricultural area was reduced by 0.02% by reducing by 0.04% the arable land areas and the pastures by 0.12%. (58.85)

Table 2. Structure evolution of agricultural land, by categories of use in Galați

Categories of use	2010 (Ha)	2014 (Ha)	(±) % 2010
Agricultural area, of which:	358,394	358,311	-0.02
arable	293,043	292,926	-0.04
pastures	43,663	43,612	-0.12
grasslands	656	656	0.00
Vineyards and vinicultural nurseries	19,316	19,397	0.42
Orchards and fruit nurseries	1,716	1,720	0.23

Source: data processed by the GALAȚI County Directorate of Statistics.

From the structure evolution of the main crops, shown in Table 3, there is a high proportion of

grains (67.11% of the cultivated surface of Galati in 2014) the share decreasing in 2018

From the data presented in table 3 there are higher weights of maize (39.68%) of the cultivated area, followed by wheat and rye (19.33%) and sunflower (17.58%). Taken as a

whole, there is a decrease in the share of most areas cultivated in 2014 compared to 2018, except for the pea crop which registers an increase of 794.08%.

Table 3 The structure evolution of the arable land cultivated with the main crops, in Galati County

Specification	2014 (Ha)	%	2018 (Ha)	%	(+) % of the
Total cultivated area	283,976	100	275,685	100	-2.92
Grains	190,589	67.11	162,248	58.85	-14.87
Wheat and rye	54,882	19.33	47,934	17.39	-12.66
Maize	112,674	39.68	96,671	35.07	-14.20
Leguminous	1,829	0.64	9,929	3.60	442.86
Peas	1,048	0.37	9,370	3.40	794.08
Beans	751	0.26	557	0.20	-25.83
Oleaginous plants	68,828	24.24	82,438	29.90	19.77
Sunflower	49,918	17.58	54,058	19.61	8.29
Potatoes	1,436	0.51	1,117	0.41	-22.21
Vegetables - total	11,540	4.06	1,0202	3.70	-11.59

Source: data processed by the GALAȚI County Directorate of Statistics.

The structure of crops influences the production results and the profit of the exploitation through the use of the exploitation capital, as well as through the incomes which have consequences on the formation of a part of the production expenses (Stanciu, 2017). In addition, it is considered that the choice of certain crop structures have a determining role regarding *the best placing in the value of the land* (if it ensures consistency between the requirements of plants and conditions offered by the land areas), *the use of other production factors, a better use of potentialities of the exploitation and the natural environment, the size of income*

*and profit, the degree of use of labor and the wages* (when they use labour employment) etc. In conjunction with the medium productions by hectare and areas cultivated, in the region of Galati were produced important quantities of plants (Table 4). It can be seen that a significant share is represented by the cultivation of maize, increasing by 32.78% in 2018 compared to 2014. The increasing for share of certain crops in the total plant production, consists of peas (306.63%), followed by sunflower (45.57%) and maize (32.78%).

Table 4. Evolution of total plant production obtained in Galati County

Galati County	2014 (Tons)	2018 (Tons)	(±) % compared to 2014
Grains, of which:	739,650	881,848	19.23
Wheat and rye	199,255	179,704	-9.81
Maize	481,538	639,398	32.78
Leguminous, of which:	3,027	8,577	183.35
Peas	1,960	7,970	306.63
Beans	1,055	605	-42.65
Oil plants	152,234	207,407	36.24
Sunflower	101,106	147,179	45.57
Potatoes – total	22,472	15,887	-29.30
Vegetables – total	271,636	276,713	1.87

Source: data processed by the GALAȚI County Directorate of Statistics

The use of agricultural land is determined by the overall evolution of human society, mainly by the demand-supply ratio of agricultural products that manifests itself on the market.

The demand for agricultural products is determined by the needs of final or productive consumption, needs directly related to the number of the population, its purchasing power

and the degree of integration and development of agricultural raw materials processing industries. The supply of agricultural products is determined by the area in the agricultural circuit and the level of yields per hectare.

The use of agricultural land is influenced by the agricultural-climatic conditions, as well as by the economic, financial, demographic, technical and technological conditions, existing in a country at a given time.

Thus, three ways of using agricultural land are known: *extensive*, *rational* and *intensive*. Each form involves several stages of manifestation: *appearance*, *development*, *maturity*, *decline* and *disappearance*.

Among the indicators used in assessing the use of agricultural land:

1. *The structure of agricultural land by categories of use (formula 1)* calculated as a percentage ratio between the area owned by each category of use and the total agricultural area:

$$ITA = \frac{Scu}{SA} \quad (1)$$

a) for arable lands:

$$I_{TA} 2010 = (293.04/358.40) * 100 = 81.76 \%$$

$$I_{TA} 2014 = (292.92/358.31) * 100 = 81.75\%$$

When  $I_{TA} < 67\%$ , land use is extensive; when  $I_{TA} \approx 67\%$ , the land use is rational, and when  $I_{TA} > 67\%$ , the land use is intensive. It results that in Galati County, the use of arable land is intensive, without variations in the period 2010-2014

b) for vineyards and orchards:

$$I_{TA} 2010 = (19.31/358.39) * 100 = 5.38\%$$

$$I_{TA} 2014 = (19.39/358.31) * 100 = 5.41\%$$

When  $I_{TA} < 7\%$ , land use is extensive; when  $I_{TA} \approx 7\%$ , the land use is rational, and when  $I_{TA} > 7\%$ , the land use is intensive. We can conclude that in Galati county, the use of land with vineyards and orchards is extensive.

c) for natural pastures and hayfields:

$$I_{TA} 2010 = (43.66/358.39) * 100 = 12.18 \%$$

$$I_{TA} 2014 = (43.61/358.31) * 100 = 12.17\%$$

When  $I_{TA} < 25\%$ , land use is extensive; when  $I_{TA} \approx 25\%$ , the land use is rational, and when  $I_{TA} > 25\%$ , the land use is intensive. The result is a rather small value, which shows that the cultivated area with pastures and hayfields is very small and that in the whole county, the use of the land with pastures and hayfields is extensive.

2. *The share of uncultivated areas in the total arable area (formula 2)* shall be calculated as a percentage ratio between the uncultivated arable area and the total:

$$ISn/Sa = \frac{Su}{Sa} \quad (2)$$

$$I_{TA} 2010 = (4.95/358.39) * 100 = 3.96\%$$

$$I_{TA} 2014 = (4.39/358.31) * 100 = 5.40\%$$

When  $I_{Sn/Sa} < 10\%$ , land use is extensive; when  $I_{Sn/Sa} \approx 10-20\%$ , the land use is rational, and when  $I_{Sn/Sa} > 20\%$ , the land use is intensive. It turns out that in Galati county the use of arable land is extensive.

3. *The degree of intensity of agricultural land use (formula 3)* is determined as the ratio between the conventional agricultural area (the categories of use are transformed into conventional arable land by applying equivalence coefficients) and the total agricultural area:

$$Gi = \frac{\sum_{i=1}^n Si \times ki}{\sum_{i=1}^n Si} \quad (3)$$

where:  $S_i$  represents the area occupied by the use category (arable, pastures, hayfields, vineyards, orchards), and  $k_i$  represents the equivalence coefficients between the other categories of agricultural use and the arable land (Table 5).

Table 5. Evolution of the intensity degree of agricultural land use

Categories	Coefficients of equivalence	2014		2018	
		(thousand ha)	$S_i$ (thousand ha)	(thousand ha)	$S_i$ (thousand ha)
Agricultural, of which:	-	358.39	-	358.31	-
arable	1	293.04	293.04	292.93	292.93
pastures	0.2	43.66	8.73	43.61	8.72
grasslands	0.5	0.66	0.33	0.66	0.33
vineyards	8	19.32	154.53	19.4	155.18
orchards	5	1.72	8.58	1.72	8.6
Intensity degree ( $G_i$ )%	-	129.71		129.98	

Source: own calculation of the data of GALATI County Directorate of Statistics

4. The crop structure of arable land (formula 4) is determined as a percentage ratio between the area owned by each crop and the total arable area:

$$I_{ci/Sa} = \frac{Sci}{Sa} \quad (4)$$

The assessment of this indicator is made according to the share of intensive crops (peas, sunflower, vegetables and tobacco) in the total arable area.

When  $I_{ci/Sa} < 10\%$ , land use is extensive; when  $I_{ci/Sa} \approx 10-20\%$ , land use is rational, and when  $I_{ci/Sa} > 20\%$ , land use is intensive.

Analysing the crop structure of arable land and considering the crops of peas, sunflowers and vegetables, it results that in Galati County in 2014 (22.01%) the land use is intensive (Table 6).

From the data presented in Table 6 it results that, in Galati County in 2018 compared to 2014, the share is close to intensive crops, respectively a share of 19.61% for sunflower in 2018 compared to the share of 17.58% in 2014 and in vegetables, in 2018, 3.70% to 4.06% in 2014. For peas, the share was of 3.40% in 2018 to 0.37% in 2014.

Table 6. Share evolution of intensive crops in arable land in the county of Galati

Specification	2014		2018		(±) % 2014
	Ha	Ici/Sa (%)	Ha	Ici/Sa (%)	
Total cultivated area	283 976	-	275 685	-	-
Cereals	190 589	67.11	162 248	58.85	-8.26
Wheat and rye	54 882	19.33	47 934	17.39	-1.94
Maize	112 674	39.68	96 671	35.07	-4.61
Leguminous	1829	0.64	9929	3.60	2.96
Peas	1048	0.37	9370	3.40	3.03
Beans	751	0.26	557	0.20	-0.06
Oleaginous plants	68 828	24.24	82 438	29.90	5.67
Sunflower	49 918	17.58	54 058	19.61	2.03
Potatoes	1436	0.51	1117	0.41	-0.10
Vegetables - total	11540	4.06	10202	3.70	-0.36
Total intensive crops	-	22.01	-	26.72	4.7

Source: own calculation of the data of GALATI County Directorate of Statistics.

## CONCLUSIONS

The structure of land use has changed substantially in recent years, which is why the area of agricultural land of agricultural holdings in the individual sector has increased and is cultivated jointly, in various informal family associations without legal personality.

The cooperative sector has completely disappeared: agricultural production cooperatives (as well as some state farms) have been transformed into various legal entities, which today control a percentage of 92.11% of agricultural land, including private companies and the remnants of the former agricultural sector of Galati County.

Mutations occurring in the economic and social structure of agricultural units affects not only the aspect of territorial increase, but in particular the increase of the level of production concentration, accompanied by increased efficiency towards small and medium farms.

Increasing production per unit area is considered to be the most important means of increasing agricultural production, although it must be practiced carefully, because excessive use, unbalanced and inconsistent with the requirements of plants is associated with very serious pollution problems of the environment (soil, water, air), obtaining agricultural products with pesticide and nitrate residues, etc.

The potential harvest is determined primarily by the cultivated variety or hybrid, respectively by the genetic dowry possessed by the cultivated plant and which can manifest itself more or less depending on the action of other factors of production. Crop production is directly affected by temperature and precipitation, extreme climatic events (floods, droughts, storms, etc.) and high concentrations of CO<sub>2</sub> in the air.

Due to climatic conditions, one year may be unfavourable to one region in terms of crop

production, and at the same time, it may be favourable to another region.

Influenced by the size of the cultivated areas, by the average productions per hectare and by the climatic conditions, the total production in Galati county had a fluctuating evolution. The increase of the efficiency of the agricultural production in Galati County supposes, besides the increase of the yields at the production unit (*hectare*), an improvement of its quality.

During the analysed period, the total production achieved for the main crops in Galati County registered increases in some crops, but also significant decreases in others. Thus, there were increases in total production of cereals for grains (19.23%) legumes for grains (183.35%) and oil plants (36.24%), decreases in total production for wheat and rye (9.81%), beans (42.65%) and potatoes (29.30%).

In the conditions of the functioning of the market mechanisms, possibilities are created for the organization of viable agricultural units, which can produce for commercialization.

Leasing is practiced less in individual farms and more in units with legal personality. The extension of the lease is possible under the application of an agricultural policy favourable to the development of national production, the application of measures provided to support with non-reimbursable funds from the EU young people who have the appropriate training and want to set up farms, access to bank funds and promote technologies modern.

Dissatisfaction with "excessive fragmentation" of property is prevalent among decision-makers and smallholder farmers. In our opinion, the best solution would be to analyse the incomes of rural families with farms of different sizes (including all agricultural and non-agricultural components) and determine the incidence of poverty (which is inability to have a minimum standard of living) from different size categories. farms. This would provide a first indication needed to identify farms that are too small even to meet subsistence needs and should be the subject of the merger.

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