

**NATURAL AND ECONOMIC FUNDAMENTALS OF LAND USE
(on the example of ATU Gagauzia)**

PARMACLI Dmitrii,

Doctor Habilitatus of Economic Science, professor,
Comrat State University, the Republic of Moldova
e-mail: parmad741@mail.ru

DUDOGLO Tatiana,

PhD in Economics., interim associate professor,
Comrat State University, the Republic of Moldova,
e-mail: dudoglo_tatiana@mail.ru

Abstract: *This work presents an assessment of the current composition of agricultural land in the context of regions and in general for the ATU Gagauzia and it demonstrates the socio-economic role of land in the development of the region. The qualitative characteristics of agricultural land in the autonomy for each settlement, as well as the results of the transfer of land to private ownership and the existing structure of business entities on the basis of land ownership are given. The structure of the sown area of autonomy is presented in the form of a table. The article emphasizes that the achieved land productivity in the autonomy lags significantly behind the potential opportunities of the fertile chernozems of the region, for which the table shows the scientifically-based (potential) and prevailing levels of productivity of the main agricultural crops in the ATU Gagauzia for 2009-2018. Farmers of autonomy achieved fruit yields less than 1/3 of the scientifically based level, yields of corn and winter wheat are slightly higher than 2/5 and 1/2 respectively, sunflower is 2/3 and grapes is almost 3/4. There are listed the causes of such a sharp drop in land use intensity. In conclusion, it is noted that the efficiency of land use in agriculture in modern conditions is determined by a more complete use of the potential of land fertility and the provision on this basis of a substantial increase in crop yields.*

Key Words: *agricultural land, arable land, effectiveness of the land use, productivity, soil, land fertility, structure of sown areas.*

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Introduction

For a country that has in fact a full development of the land resources and a high population density, and the economy of which is largely determined by the level of development of agriculture, the problem of using agricultural land becomes of vital economic, environmental and social importance.

The question is quite natural: how effective are used land resources in agriculture, in which the economic and natural processes of reproduction are closely linked?

ATU Gagauzia is located at the epicenter of the zone with insufficient moisture, in the zone of unstable (risky) farming. The average annual rainfall is about 380 mm. Agriculture on the territory of the autonomy is often harm by the adverse natural phenomena. These include droughts, dry winds, strong winds, dust storms, late spring and early autumn frosts, hail and others [1, p. 61-63].

Land is the most important wealth of our society, which is why increasing its productive power is a national task. Improving soil fertility is one of the main tasks of agriculture and of each land user. The subsoils of our territories are practically deprived of ore and combustible minerals, our own hydropower resources are very limited, and forest tracts occupy a small area. Therefore, the main natural productive forces used in the region are climate (heat and light resources) and especially soils, which largely determine the economic potential of autonomy, their role in the international division of labor [2, p. 21].

Analysis of recent research

Modern agricultural science is looking for new ways to improve the efficiency of agricultural production. In this sense, the work of Pavlik V.P. is of interest. [3, p. 61-63] and Shpykuliak O.G., Materynska O.A. [4, p. 31-33], which proposed a new approach to assessing the effectiveness of products and gave explanation to the factors for its growth.

The studies of Altuhov A.I. also appear to be important [5, p. 2-11]. In them, the author explores the modern approach to assessing the effectiveness of land use in agriculture.

Among the Moldovan authors, it should be noted the work of doctors of the habilitat of economic sciences A. Stratan, V. Doga and E. Timofti, who developed and proposed in their studies their own options for the economic mechanism for increasing agricultural efficiency based on rational use of land [6, 7, 8]. Work of Doctor of Economics L. Todoric is also of great importance and its aim is to study the problems of sustainability of agricultural production [9].

Statement of the main results of the study

Agricultural lands of Gagauzia account for 138 thousand ha, arable land and perennial plantings occupy 104.7 thousand ha and 10.9 thousand ha, respectively (Table 1). The plowing area is one of the highest in the world: cultivated land (arable land and perennial plantings) occupies 83.8% of agricultural land.

Table 1. The composition and structure of agricultural land in ATU Gagauzia (on 1st of January 2019, ha)

Indicators	Region			ATU Gagauzia
	Comrat	Ceadir-Lunga	Vulcanesti	
Area of agricultural land	63138	48852	25982	137973
including				
arable land	46743	38777	19228	104748
orchards	2022	1534	452	4008
grapes	4446	2332	3245	10023
nut plantations	233	82	517	833

Source: data from the Office of the Cadastre, Land Fund, Ecology and Water Resources of ATU Gagauzia

The territory of autonomy is located in the Bugeac steppe, which is part of the south-Moldavian hilly plain. Its surface is crossed by wide valleys, and the slopes are cut by numerous ravines. The relief of the region is characterized by steppes and small hills, there are also small rivers Ialpuj, Ialpujel, Lunga and Lunguta. Gagauzia, like the rest of Moldova, is located in the Carpathian seismic zone. The soil in the ATU Gagauzia is represented by carbonate chernozems - 65.4 thousand hectares and typical low-humus chernozems - 63.4 thousand hectares. The water resources of the region are mainly represented by groundwater sources with a volume of 8-10 million m³. Surface sources are limited. In the territory of ATU Gagauzia there are two large reservoirs: in Comrat - with a water mirror area of 1.7 km² and in Congaz - 4.9 km². Mineral reserves on the territory of the autonomy are insignificant and are represented by sand, clay, and insignificant deposits of brown coal, which lies in thin layers and is of poor quality, which makes its extraction not profitable [10, p. 11-12].

The qualitative characteristics of agricultural land is characterized by rather high bonitet indicators (Table 2). The weighted average score at the beginning of 2018 is 58 points.

As can be seen from the table, the soil quality index is presented in the decreasing order, starting with of the city of Ceadir-Lunga (66 points), Mun. Comrat (65), Vulcanesti (65), v. Congazic de Sus (62), p. Etulia (60) and the village of Cismichioi (60). Low soil quality index (bonitet) is a characteristic of the lands of the village of Bugeac (48) and the village of Carbalia (45).

In ATU Gagauzia 64271 ha or more than 44% out of 145 thousand ha of examined lands are subject to varying degrees of erosion. Every 15 hectares of land is heavily eroded, which, of course, causes serious concern to land users.

Soils, as noted above, are the main type of natural resources in ATU Gagauzia, and they are the most important criterion for determining the productivity of the main factor of production in rural areas. The effectiveness of land use largely depends on the fertility of soils, their rational and targeted use, protection from adverse natural and human actions, scientifically based land reclamation and chemicalization of agriculture.

As a result of land privatization in the countryside, new agroformations were created on the basis of former collective farms and state farms, and they have the form of agricultural cooperatives, limited

liability companies, joint-stock companies, and also peasant (farmer) farms. As of the beginning of 2019, there was one collective farm in the autonomy (collective farm "Pobeda", the village of Copceak), 8 cooperatives, 14 joint-stock companies and 312 limited liability companies. With few exceptions, new agricultural enterprises covered 200-400 hectares of arable land and perennial plantings located in three to four different massifs, and peasant farms consist up to 30-40 hectares. The existing crop rotation systems were violated everywhere, and field cutting has undergone significant changes.

Table 2. Qualitative characteristics of agricultural land in the ATU Gagauzia on January 1, 2018

№	Name of administrative territorial unit	Total agricultural land (ha)	Examined lands (ha)	Weighted average assessment of soil bonitet (in points)	Eroded land			
					Total	Including		
						lowly	moderately	highly
1	Comrat	12563	12350	65	4620	2267	1538	815
2	Ceadir-Lunga	7311	6925	66	1894	1323	506	65
3	Vulcanesti	12638	12152	65	6196	3668	1435	1093
4	Avdarma	5213	5069	51	3283	1785	986	512
5	Baurci	6044	5819	57	1927	1108	508	311
6	Besalma	4695	5000	51	2240	836	871	533
7	Besghioz	4218	4169	58	1388	836	503	49
8	Bugeac	1866	2040	48	1111	387	336	388
9	Carbalia	1732	1714	45	1041	404	361	276
10	Cazaclia	8144	7952	49	3677	1644	1374	659
11	Ciriet-Lunga	4536	4436	53	2572	1481	717	374
12	Chirsovo	8510	8549	57	3528	1820	1080	628
13	Cioc-Maidan	6042	5659	53	3143	1555	944	644
14	Cismichioi	7639	7756	60	3471	1892	991	588
15	Chioselia Rusa	896	837	53	359	150	91	118
16	Congaz	10625	10854	58	3632	2194	1099	339
17	Congazcic de Sus	2831	2575	62	1343	943	266	134
18	Copceac	8940	8891	58	2737	1913	701	123
19	Cotovscoe	1173	1145	55	482	217	121	144
20	Dezgengea	8044	8304	59	4688	2738	923	1027
21	Etulia	5041	4929	60	2224	962	949	313
22	Ferapontievca	2811	2734	58	1204	991	213	
23	Gaidari	4161	4071	54	1946	924	737	285
24	Joltai	2681	2614	56	1592	1114	442	36
25	Svetlii	2310	2546	59	713	491	199	23
26	Tomai	6331	6204	54	3260	1811	945	504
	Total	147004	145294	58	64271	35454	18836	9981

Source: data from the Office of the Cadastre, Land Fund, Ecology and Water Resources of ATU Gagauzia

Obviously, the creation of new enterprises was carried out without taking into account the need to form optimal-sized farms that allow cultivating crops on the basis of modern intensive and highly-mechanized technologies, maximizing the use of potential land productivity and ensuring high break-even yield levels.

A significant part of crop production is now produced in households and peasant (farmer) households on small land plots, mostly using outdated technologies. Many technological operations are partially mechanized or manually performed. In this regard, the problem of land consolidation and the enlargement of agricultural enterprises to the optimal size remains very urgent.

The transfer of land to private ownership is completed. More than 4/5 of arable land, almost

nine out of ten hectares of perennial plantations are transferred to private ownership. By the end of 2018 around 83.9% of them were in the use of peasant (farmer) holdings and households in the Republic of Moldova. Agricultural enterprises account for 50.5% of the cultivated, 31.8% belong to peasant (farmer) enterprises, and 17.7% in households. A similar structure is observed in the ATU Gagauzia. As we can see, half of the arable land is cultivated by small land users. It is quite obvious that small land allotments do not allow land users to use modern complexes of machines that provide mechanized cultivation of grain and other crops [11, p. 60].

In agricultural practice of developed countries there are increasingly used modern high-intensity crop production technologies. The introduction of optimal doses of organic and mineral fertilizers, the purchase of high-yielding varieties and hybrids, modern plant protection products, and the saturation of the industry with high-performance equipment, which significantly reduces losses during harvesting, require huge amounts of financial investments per unit of land area. Nevertheless, the reality shows that the current state of land use in the industry has considerable reserves of growth returns on the main means of production. The existing low saturation of the industry with material and financial resources, the relative sufficiency of labor in the countryside can increase the return on land use by 25-40%, if introduced the proper organization of production, the competent use of the achievements of science and best practices, and increased technical discipline. And these are huge reserves.

Since the beginning of the 90s, the agrarian policy of the Republic of Moldova was aimed at ensuring socio-economic processes related to changes in ownership and management in rural areas, liberalization of economic activity, adaptation of the industry to work in a market environment. However, this led, unfortunately, to the degradation of agricultural land, and lack of effectiveness of land use.

The fuller and highly productive use of land, increasing of soil fertility, maintaining the economic equilibrium in nature are the most important problems of modern agriculture in the ATU Gagauzia.

The sown area of crops in farms of all categories of autonomy amounted to an average of 94,315 ha for 2016-2018, of which 62.6% was occupied by cereals and legumes, 35.3% by industrial crops, 0.2 % by potatoes, vegetables and melons, 1.9% by feed crops.

A special and extremely important place among the branches of crop production is grain production, which forms the basis of crop production and all agricultural production. It accounts for more than 3/5 of the sown area.

Note that in the structure of grain and leguminous crops, wheat and corn occupy more than half of the entire sown area. Attention should be paid to the high share of sunflower. Approximately every third hectare of crops in the autonomy is occupied by this highly profitable crop. Thus, wheat, corn and sunflower crops account for more than 4/5 of all crops (82.9%). That is why it is very important to ensure a high yield per unit area of crops of these crops.

At the same time, potatoes and open-field vegetables are not essentially grown in agricultural enterprises in the ATU.

An important role is given to feed crops. However, due to the sharp reduction in the number of cattle in the post-privatization period, less than 2% of the sown area is allocated for feed crops. Noteworthy is the very low proportion of feed crops in the structure of crops and an excessively high proportion of sunflower. The structure of the sown area of autonomy is presented in Table 3.

At the beginning of 2019 agricultural land occupied 142674 hectares in the autonomy. As a result of privatization, less than 1% of the land are now in state ownership.

Studies have shown that the achieved land productivity in autonomy lags significantly behind the potential capabilities of our fertile chernozems (Table 4).

As can be seen from the table, autonomy farmers achieved fruit yields less than 1/3 of the scientifically based level, the yields of corn and winter wheat are slightly above 2/5 and 1/2 respectively, sunflower higher by 2/3 and grapes by almost 3/4. Thus, the greatest lag is noted in the fruits and corn production.

Here are just a few reasons for the low productivity of land.

In agriculture, the level of chemicalization in the production of grain, industrial, vegetable and other crops has significantly decreased. In 1980-1990 the removal of the main elements of plant

nutrition was offset by the introduction of mineral and organic fertilizers by 60%, nowadays - by only 10%. Over the past 20 years, the application of organic fertilizers in Moldavian fields has decreased from 9.7 million tons to 0.07 million tons or 140 times, mineral fertilizers - 27 times, the use of water for irrigation has significantly decreased.

Table 3. The sown area of crops in the ATU Gagauzia
(in farms of all categories, ha)

Indicators	2000	2016	2017	2018	In average for 2016-2018	
					total	%
Cultivated area, total	76091	90675	94966	97303	94315	100
Grains and leguminous grains	49763	58690	57857	60427	58991	62,6
Spring and winter wheat	26302	34984	32475	35897	34452	36,5
Spring and winter barley	5335	10608	9753	7904	9422	10,0
pea	6393	-	1306	1771	1026	1,1
corn	10938	11969	13788	14158	13305	14,1
Industrial crops	15958	29822	35235	34926	33328	35,3
sunflower	13942	27741	31319	32258	30439	32,3
rapeseed	-	1981	3834	2668	2828	3,0
tobacco	1986	100	82	-	61	0,1
Potatoes, vegetables and melons	712	112	73	503	229	0,2
potatoes	-	-	-	-	-	-
vegetables	624	5	-	4	3	-
melons	88	107	73	499	226	0,2
Feed crops	9658	2051	1801	1447	1766	1,9

Source: given according to the General Department of the Agro-Industrial Complex ATU Gagauzia

Table 4. Science-based (potential) and prevailing levels of productivity of the main agricultural crops in the ATU Gagauzia

Crop	Yield, t/ha				
	potential	actual average		ratios of actual productivity to (%)	
		in 2009-2018	actually achieved (for the 3 most productive years)	% of potential level	% of actually achieved level
Winter wheat	48,0	27,5	34,5	57,3	79,7
Corn	66,0	27,8	39,4	42,1	70,6
Sunflower	25,8	17,9	22,2	69,4	80,6
Fruits	228,5	65,2	107,7	28,5	60,5
Grapes	76,7	54,0	82,5	70,4	65,5

Source: elaborated by the authors based on [12, p.96-97]

The reasons for such a sharp drop in the level of land use intensity are not only due to a decrease in the use of organic and mineral fertilizers, insufficient and incomplete material and technical support, which reduces the adaptation of the industry to adverse weather conditions, but, just as importantly, an overall decrease in the quality of technological operations, caused in addition to the above reasons, by an excessive fragmentation of land. The latter also had that negative consequence, which led to a total disruption of crop rotation, of the normal alternation of crop cultivation.

The complete independence of land users has also led to a significant change in the structure of sown areas in the direction of a sharp decrease in the share of peas and perennial grasses, which contribute to increasing soil fertility, and an increase in the sown area of sunflower and winter rape, as highly profitable crops, but most significantly depleting the soil. That is, we have come to such a

structure of crops that is not consistent with the recommendations of science and best practices. In the pre-reform period, perennial grasses and peas occupied 16% of the autonomy in the structure of sown areas, nowadays it is just 4.0%. So, on average for 1981-1990 every third hectare of winter wheat was sown according to the best predecessors with leguminous crops, in recent years only every ninth hectare was sown accordingly.

In contrast to the developed countries of the market economy, the Republic of Moldova still lacks mutually beneficial marketing ties between producers, processors, and retail chains. Producers of agricultural commodity products, as a rule, do not have the necessary information about the consumers of their products, market prices, competitors, the state of the domestic and world markets for certain goods and their development forecasts. And this leads to the fact that rural producers cannot plan the volume of production and the structure of products in the medium term. They are forced to annually change the structure of sown areas, which negatively affects the efficiency of using the main means of production - land.

It cannot be ignored that at present, science has developed high-yielding varieties and hybrids from grain crops, sunflower, and other crops. However, they require, as a rule, a higher agricultural background (higher doses of fertilizers), expansion of irrigated land, i.e. to introduce methods which are not currently implemented. A return to primitive old technologies with utilization of modern varieties and hybrids is a self-deception, a path to nowhere, which is now confirmed by low productivity.

In conclusion, it should be noted that in modern conditions the effective use of land in agriculture and in the entire agricultural economy as a whole, is greatly influenced by the fuller use of the land fertility potential and the provision on this basis of a significant increase in crop yields.

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