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RESEARCH ARTICLE

Erosion Process and its Impact on Agricultural Productivity in its Intensive Development in the Territorial Land of Masalli District

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ABSTRACT

The article presents the general characteristics of geological, geomorphological, and orographic structures of soil-forming species, hydrographic network, climatic conditions, climatic factors, plant cover, and plant cover. The total area of the district is 72,097 hectares, of which 33.07% have a slope of the surface, which ranges from 1 to 350. Wrong use of steep slopes, unsystematic cutting of forest, unregulated output of livestock, and economic activity play a major role in the spread and development of erosion processes in the territory of Masalli district. Studies have shown that under the influence of erosive soils, the content of humus is 3.63%, and in heavily loamy yellow loam soils, it decreases to 1.81%. Erosion processes in the territory of the Masalli district are causing great damage to plantations of grain crops and, in particular, winter wheat, reducing their yield. Thus, in the middle-mountainous forest-forest soils, the yield of green leaves of corn per hectare is 1118 kg, in heavy duty 536.5 kg. In non-washed mountain-forest yellow soils, the yield of winter wheat per hectare is 16.5 ts and medium washed 7.9 ts.

Key words: Erosive processes, Fertility, Medium and strong washed soil, Mountain-forest yellow soil, Not washed, Plant cover, Steep slopes, Washed

INTRODUCTION

Vegetables, tea, tobacco, potatoes, wheat, and other crops are grown in Masalli region, which has an appropriate natural climate in terms of agriculture. In such a climate, it is possible to get more from those plants. However, the erosion process does not allow it. As a result of the erosion process, soil fertility decreases, which, in turn, leads to a decrease in crop yields.

Surface slope of the area, geological geomorphological and orographic structure, soil-forming rocks, soil compaction, hydrography, network of soil erosion vegetation, climatic conditions, and other factors have a great impact, and they are characterized by the urgency of a comprehensive study. It is considered to be an important contribution to the development of national agrarian science. Thus, due to the cultivation of these areas around the ancient Silk Road, the study of the role of existing relief elements in the development of erosion by modern methods and the determination of the quality of these lands and the establishment of cultural pastures on the plateau creation of a solid and strong fodder base in the country. At the same time, taking into account, their soil protection importance, sowing of perennial grasses (such as alfalfa, Khasha, valerian, etc.).

Masalli district is located in the South-Eastern part of the Republic of Azerbaijan and has a total area of 1942 km^2 (or 72,097.5 hectares).

Tectonic, volcanic, ancient glacial phenomena, and hydrographic sources played an important role in the formation of the area.

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Geological and geomorphological structure of the region: It was studied by PP Avdusin (1932), NN nLebedev (1941), BA Antonov (1955), AA Ibrahimov (1994), ZH Aliyev 2001), and others.

Tovuz region is divided into two completely different geological and geomorphological structures.

1. Mountainous part
2. Plain part.

The mountainous part of the region is very indented. This section is characterized by mountain ranges, depressions, river terraces, terrace-like hills, and small heights with different inclinations.

The surface slope of the area plays an important role in the emergence and development of the erosion process in the Tovuz region. It is clear from the surface inclination map compiled for the region that the surface inclination varies in the region.

As shown from Table 1, 30.64% of the total area of the district is occupied by 3–300 or more areas.

Rocks forming various soils are spread in the territory of the region, which has complex geological geomorphological and orographic features.

The course of the study

Characteristics of the research object area

The study area includes a group of rocks that form intrusive and effusive, typhoid, sand, clay, carbonate, alluvial, delluvial, proluvial, and other soils, mainly belonging to the third period sediments in the mountainous part.

Soil cover also plays an important role in the development of the erosion process. Soil-forming parent rocks, soil type, mechanical composition, location, inclination, and resistance to erosion have a great impact on the erosion process at different intensities.

Table 1: Distribution of the territory of the region according to the superficial slope

Surface inclination of the area, in degrees	Area	
	Hectares	With interest
0–1	4609	63.93
1–3	912.5	5.43
3–5	1557.5	2.16
5–10	3275	4.54
10–15	3415	4.74
15–20	4080	5.66
20–25	4545	6.30
25–30	3302.5	4.58
>30	1920	2.66

The spread of the erosion process in Masalli region is shown in the works of BV Gussak (1960), KA Alakbarov (1961), Kh.M. Mustafayev (1962), and others.

Scientific and methodological substantiation of the research:

Analysis methods

1. Humus-İ.V. According to Tyurin's method
2. Total nitrogen-Tyurin I.V.-Kononova M.M
3. Lost Ammonia-D.P. according to the method. Konyeva
4. Water-soluble ammonia-Colorimeter with Nesler reagent
5. Nitrates-Grandval-By the false method
6. Phosphorus-B.P. according to the method. Poppy
7. Interchangeable potassium-with a flammable photometer
8. Carbonate-Calcimeter according to the Schebler method
9. Soil structure and aggregate composition-N.I. Savvinova
10. Mechanical composition of soil-N.A. Kaczynski
11. Principles of victory (I and I)-According to the method of Shchedroys
12. Natural and hygroscopic soil moisture-by gravity
13. Bake the mass (layer 0-30 cm)-N.A. by the method. Ponkova
14. Earth mass-cylinder I.S. Vasilyeva
15. Product definition-moving the product from beginning to end.

EXPECTED RESULTS

Discussion and analysis of the results of field soil erosion studies

Field soil erosion studies are carried out according to the methodical approach proposed by S.S. Sobelev, cuts are made and determined by mathematical calculations based on the analysis of the results obtained from soil samples taken from different genetic layers.

The terrain is mountainous, the steep slopes are bare, the atmospheric sediments are torrential, the forests are unsystematic, the agro-technical rules are not followed properly on the steep slopes, and the grazing of cattle is unsystematic and widespread.

Erosion was not observed only in areas with dense natural vegetation.

The study shows that as a result of the erosion process, the amount of humus, easily digestible nutrients, and absorbed bases in the yellow soil type of the Tovuz region vary depending on the degree of soil washing.

It is clear from the figures given in Table 2 that the amount of humus in the top layer of the yellow soil from the unwashed forest is 3.63%, the amount of absorbed calcium and magnesium is 25.75 m eq. The amount of potassium from easily digestible nutrients is 212.1 mg/kg of phosphorus. The amount of humus in the top layer of such heavily washed soil is 1.81%, the amount of absorbed calcium and magnesium is 18.38 meq, the amount of potassium is 144.6 mg/kg, while the amount is 25, + kg/kg, the amount of phosphorus is 15.4 mg/kg.

Agriculture (especially grain and potato growing) plays an important role in the economy of Masalli region. According to Mustafayev (1959), tobacco growing in Masalli region began to develop mainly in 1936. Recently, in terms of ensuring the economic development of the regions, the development of pastures and hayfields in these areas, we need to give more importance to creating a strong and strong fodder base for livestock development due to the development of eroded lands on the slopes. This is scientifically sound, in accordance with the research method proposed by Sobelev in the Modern Approach, and the permeability of soils is based on experimental observations with the use of metal cylinders. It is explained that the determination of the coefficient of water retention in the soil during the minute is applied, and it is confirmed on scientific grounds that the application of this as a scientifically based recommendation has the potential to increase productivity.

When planting tea plantations, rows of tea plants were placed in the direction of inclination on the steep mountain slopes of some mountains, slopes of ravines and river terraces, and from the time of planting in this area until now, planting has been carried out in the direction of inclination.

Due to the slope of the area, the placement of the slopes in the direction of inclination, and the correct observance of agro-technical rules in cultivation, heavy rains have led to more intensive erosion in these areas and severe soil washing. One of such areas is located on the high mountain slope of the region. Thus, most of the river bushes scattered in the form of scattered parent rocks, which were eroded to the surface as a result of heavy soil washing, have been broken, and the surviving river bushes are very short and produce very little.

The figures given in Table 3 show that the yield of green corn leaves taken in the unwashed type

Table 2: Main agro-chemical indicators of yellow soils from different types of washed forests in the study area

Type of soil	Soil washing rate	Cut No	Genetic layer and depth at which the sample was taken, in cm	Humus content in%	Absorbed bases per 100 g of soil in m.ekv			Digestible nutrients in mg/kg	
					Ca	Mg	Ca+Mg	K_2O	P_2O_5
Yellow soil from under the forest	Unwashed	2	A_1 0–20	3.63	18.40	7.36	25.76	212.1	25.6
			A_2 20–42	1.66	30.36	13.80	44.16	175.7	23.4
			B_1 42–55	1.19	24.48	8.28	33.12	152.5	17.0
	Poorly washed	4	A_1 0–15	2.35	16.56	5.52	22.08	185.7	22.4
			A/B 15–30	1.60	17.48	9.66	27.14	154.6	19.4
			B_1 30–60	1.14	18.40	10.58	28.98	140.6	16.2
	Medium washed	7	B_1 0–11	1.92	13.56	6.66	20.22	150.0	19.4
			B_2 11–23	1.56	17.48	8.20	26.68	142.6	15.6
			B_3 23–35	1.10	18.32	8.28	27.60	135.6	12.3
	Severely washed	20	B_1 0–10	1.81	10.56	7.82	18.38	144.0	15.4
			B/C 10–21	1.13	16.00	8.74	24.74	135.2	12.5
			C_1 21–32	1.01	23.28	10.12	33.40	120.3	10.6

of yellow soils from the forest was 12,215 kg per hectare, while in moderately washed areas, it was 101,118 kg, and in heavily washed areas, 1536.3 kg.[1-5]

In yellow soils with pods, productivity also varies depending on the degree of washing.

As can be seen from the figures in the table, the erosion process reduces the productivity of the corn plant, as well as its root, height, and diameter.

The erosion process also reduces the productivity of cereals. As a result of our research, it is clear that the productivity of winter wheat (nitrogen variety) and the absolute weight of the grain vary significantly depending on the degree of soil washing.

It is clear from Table 3 that in the unwashed yellow soil under the forest, the yield of wheat per hectare is 16.5 quintals and the absolute weight of the grain is 40.23 g, while in the moderately washed area, the yield of wheat per hectare is 7.9 quintals and the absolute weight of the grain weight was 37.31 g.

In yellow soils with pods, productivity also varies depending on the degree of washing.

It is clear from the above that the erosion process in Masalli region significantly damages soil fertility and crop yields. Therefore, it is necessary to protect the soil from erosion, to protect and increase its fertility, to conduct agricultural work on the slopes, to select and place agricultural crops on the slope, and to carry out all agro-technical measures in time and correctly to prevent erosion.[6-11]

Findings

1. Mountain chernozems belong to soil groups located in the vertical direction of the southeastern slope of the lesser Caucasus
2. Mountain chernozems have high fertile potential
3. The erosion process further reduces the fertile potential of mountain chernozems.

Table 3: Wheat crop productivity in eroded soils absolute weight of the body

Type of soil	Soil washing rate	Wheat yield per hectare in s/ha	Weight of 1000 grains of wheat in g
Yellow soil from under the forest	Unwashed	16.5	40.23
	Medium	7.9	37.31
Yellow ground with podzol	Unwashed	15.8	39.95
	weak	13.3	39.52

Novelty of research work

One of the main innovations of the study is that the soil-forming rocks in the plains of the study area are found to be composed of alluvial delluvial materials of eroded rocks, which leads to intensive erosion processes in the mountainous part. Due to the widespread and intensive development of the erosion process, resulting in a decrease in crop yields, the relevance of the scientific and practical importance of the development of appropriate preventive measures to combat the intensive erosion process observed in the area are proved.

Importance of research work

The economic development of the regions of the country is reflected in a number of state programs, and in terms of ensuring the implementation of these programs on the ground, the development of pastures and hayfields in these areas, taking into account, the importance of livestock development due to the development of eroded lands, there is a basis for development. This is scientifically and economically justified, and in accordance with the research method proposed by S.S. Sobelev in the Modern Approach, the determination of soil permeability was observed by experimental experiments with a metal cylindrical device: The coefficient of water retention per minute was determined and applied. It is explained that this is confirmed by the scientific and theoretical basis, which allows to increase productivity through its application as a scientifically based recommendation. This, in turn, is of exceptional importance in preventing the damage caused to the country's economy by the current erosion process, and it is possible to take additional crops from a

Table 4: River productivity in eroded soils (Ashurlu, the territory of low-income villages)

Type of soil	Soil washing rate	Wheat yield per hectare in s/ha	Weight of 1000 grains of wheat in g
Yellow soil from under the forest	Unwashed	16.5	40,23
	Medium washed	7,9	37,31
Yellow ground with podzol	Unwashed	15,8	39,95
	Poorly washed	13,3	39,52

single cultivated area, which is accompanied by the figures shown in Tables 3 and 4.

CONCLUSION

Erosion processes in the territory of the Masalli district are causing great damage to plantations of grain crops and, in particular, winter wheat, reducing their yield. Thus, in the middle mountain-forest yellow-soil soils the yield is. Thus, in the middle-mountainous forest-forest soils, the yield of green leaves of corn per hectare is 1118 kg, in heavy duty 536.5 kg. In non-washed mountain-forest yellow soils, the yield of winter wheat per hectare is 16.5 ts and medium washed 7.9 ts.

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