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RESEARCH ARTICLE

Surface Flow and Flood in the Shamakhi District Located in the South-east Part of the Great Caucasus

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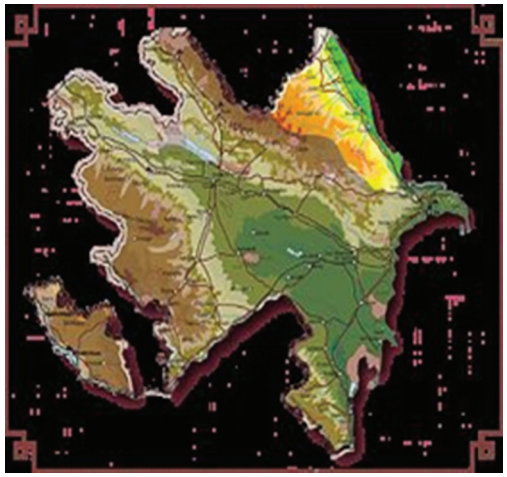
ABSTRACT

The research was conducted on the following most common soil types in Azerbaijan: Gray-brown, gray-soil-meadow, gray-brown, and mountain-gray-brown. What is common for these soils is that humus penetrates deep into the soil profile and decreases very slowly along the profile. According to the results of our research, it has been proved that the amount of humus in the 20–60 cm layer of soil is 1.24–4.19%, the total amount of nitrogen is 0.070–0.238%, and the content of mineral forms of nitrogen is almost identical to the previous soils, and in some of them, there is an increase in the content of phosphorus and exchangeable potassium compared to other soils studied. The content of carbonates in these soils. Calcium predominates in the absorbed bases, which of the total replaceable cations. The amount of exchangeable sodium in the absorbed complex is small, 2.7–4.7% of the total, and the amount of replaceable magnesium is quite high. The moisture regime of mountain-gray-brown soils is mainly determined by the amount of atmospheric precipitation and the evaporation rate of soil moisture.

Key words: Carbonate content, Leaching, Mountain-brown, Gray-brown, Gray-meadow, Gray-brown (chestnut), Gray-brown (chestnut) soils, Erosional relief, Rainfed, etc.

INTRODUCTION



After gaining independence, the Republic of Azerbaijan, as in all areas, has undergone significant changes in the field of economic regions, territorial production complexes (TPCs), and their development. In this modern period of formation and deepening of market relations, ensuring the sustainable development of the economy, and improving the social living conditions of the population attract attention with its urgency. In this regard, the study of soil erosion problems of industrial complexes in the Shamakhi economic region of the Mountainous-Shirvan region and the study of the erosion danger of these lands and the development of complex anti-erosion technologies to prevent damage to the country's economy are of great relevance in terms of scale application.

As it is known, economic regions are characterized not only by specialization, but also by the complex development of production here. In the economically developed economic regions of the country, the location of the economy in the form of TPC is clearly visible.

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One of the main tasks of the socio-economic policy pursued in the country is to direct the results of economic development to the solution of the main problems of economic regions. The dynamic development that has taken place as a result of economic policy pursued for a specific purpose creates an objective basis for solving the social problems arising from the current situation.

In the future, it is necessary to further increase the socio-economic potential of the Shamakhi region and study the factors that will ensure its development, and to conduct a comprehensive scientific study of the existing problems in the area in modern times. Ways to investigate and solve these problems ensure the relevance of the research topic.

The report refers to the relevant literature and patent materials and examines the pros and cons of irrigation and fertilization systems. In addition, the report discusses the fertilization and irrigation of arable lands to increase agricultural production in the country, the application of advanced irrigation techniques, and the application of water-saving irrigation systems in mountainous and foothill regions, meeting the water needs of plants and creating a microclimate around plants.

Purposeful and correct determination of irrigation and fertilization works is among the factors that will ensure the expected productivity.

In general, three factors should be considered when studying irrigation systems for certain fertilizers.

1. The principle of structural change of soil, that is, change of aggregate composition and violation of ecological balance. (surface runoff, infiltration, rising groundwater level, etc.)
2. Select and apply cost-effective fertilization and irrigation techniques
3. Ensuring the plant's daily nutritional needs depend on water evaporation and the application of a fertilization system.

These three conditions are one of the most important factors shaping the impact of irrigation techniques and fertilization systems on plants. The region, which covers the South-east part of the Greater Caucasus, includes the administrative territories of Agsu, Gobustan, Ismayilli, and Shamakhi districts. With a total area of 613,000 hectares, it is 7.1% of the country's territory. The surface structure is mainly mountainous.

In the South, parallel to the mountainous area, in the Shirvan plain, the altitude drops to about 200 m. The area stretching from the foothills to the watershed (Babadag to 2629 m) is divided by deep river valleys. The mountainous area, which gradually descends to the South-east, is characterized by small plateaus and ridges. The Hinaldagh, Hingar, and Langibiz ranges in the North and North-east of the area and the lowland area in the South (Shirvanduzu) have created significant complexity in the relief of the region. The application of irrigation techniques and fertilization in mountainous and foothill areas is more difficult than in plain areas.[1-10]

These difficulties are that in mountainous and foothill areas we face steep slopes, and in order to create a stable pressure for each slope, it is necessary to use special protectors, regulators, and special structures that implement the principle of equal distribution of irrigation water and proper fertilization to be held.

Therefore, in mountainous and foothill areas, the proper use of irrigation and fertilization systems that meet the needs of the day (including the application of aqueous solutions of fertilizers through irrigation techniques is the most important issue to increase productivity). The research will study the important role of the Shamakhi region in improving the fertility of eroded soils on the South-east slopes of the Greater Caucasus.

For this purpose, effective soil protection measures have been studied that experimental research is being carried out in the area to determine. According to the results of the experiments to be carried out at the research site, mineral fertilizers and irrigation will be applied in the optimal norms and proportions compared to the natural land area.

In this regard, in accordance with the calendar plan of the current research year in the second stage of the work, the improvement of the suitability of eroded soils in the area as an important technology in the modern scientific approach to the regulation of erosion hazards developed here: The role of given mineral fertilizers, the expected positive results in the dynamics of nutrients in the soil, the accumulation of humus and nitrogen in the soil, the dynamics of total moisture in the study area, changes in the structural and aggregate composition of these soils, and the effect of irrigation and fertilization on surface and ground mass.

During this period, in accordance with the calendar plan of the current year, two sections were made in the field of experiment selected on the research

topic, soil samples were taken and brought to the institute and handed over to the chemical laboratory for analysis. In addition, field preparations were carried out in the research area – terrace leveling works, fertilization works in the field of young fruit plants (apple and pear), etc. conducted.

In addition, barley and grass grown in the experimental field were harvested and sunflower and corn could not be harvested, as these plants were destroyed by drought.

For the known purpose, two short-term scientific trips were organized to the territory of the research object.

As noted during the current research year, the results of literature analysis and patent studies, laboratory analysis of cuttings and soil samples taken from the study area showed that due to the large amount of legumes planted in the field, formation of humus was observed.

This, in turn, proves the innovations that will be achieved to increase the effectiveness of large-scale application of the results of numerous studies conducted to improve the structural and aggregate composition of eroded soils, known to science.

In the experiments conducted in different variants in the area of the research object, the surface water and soil washing were studied and important results were obtained, which can be recommended for application.

For this purpose, 3-year observations were made on the surface flooding and soil washing on the mountain slopes of the region in the example of the research object area during the rains in the known purpose experiments put in different variants during the researches.

It should be noted that various methods are used in general research in the field of erosion, especially to determine the amount of washed soil during water erosion.

Thus, erosive rains are used. Thus, to determine the amount of soil washed away after erosive rains, the width, length, and depth of the furrows after the rains are measured and it is determined how much soil is washed away from one furrow. Then, by calculation, that amount is converted into one hectare [Figures 1 and 2].

Of course, we do not consider such a calculation of the amount of washed soil to be methodologically correct. This is explained by the fact that turning

Figure 1: Field soil erosion studies

Figure 2: Laboratory analysis of soil samples

one hectare of washed land into one hectare means that the entire area of one hectare is completely covered with furrows, which is impossible.

On the other hand, it is determined how much soil is washed from a small furrow, but it is not known how much rainwater is used to wash so much soil. However, such a calculation of soil erosion is completely approximate.

From this point of view, to increase the efficiency of the research, the relevant research methodology was selected in accordance with the work plan, 1 ha of experimental area was selected in the Institute's Support Station, located in Melham village of the region for field soil erosion research, agro-technical measures, including preparation of relevant fields, have been carried out. For this purpose, the relevant research methodology was selected in accordance with the work plan, the relevant agro-technical measures, including the relevant agro-technical measures in the area of 1 ha, located in the territory of Melhem village of the region, in the Support Station of the institute. Relevant field leveling works were carried out.[11-13]

The experimental area was selected according to the approved scheme in the area of the research object, where two experimental stationary flow sites were developed and installed for the purpose of

Table 1: In the washed-out mountainous-brown soils of the Shamakhi regionsome water-physical indicators

S. No.	Cut	Depth	Natural moisture	Hygroscopic moisture	Humus	Nitrogen	Motor phosphorus
1.	Washed 1	0–20	37.15	5.54	4,19	0,238	19,99
2.		20–40	36.99	5.81	2.06	0.126	17.72
3.		40–60	36.20	5.92	1.24	0.070	16.66
4.	Unwashed 2	0–20	30.32	5.71	2.74	0.168	18.88
5.		20–40	30.16	6.45	1.03	0.056	16.66
6.		40–60	30.06	6.94	0.72	0.042	15.55

conducting field soil-erosion researches in the field by developing an experimental scheme for studying surface flow and soil washing.

To determine the moisture dynamics and the amount of nutrients and humus from every 20 cm layer in the 0–60 cm layer, soil samples were taken and analyzed in laboratory conditions, and the results were compared and analyzed [Table 1].

To conduct field soil-erosion research, two stationary flow sites with a total area of 50 m^2 were developed and installed according to the scheme. There is an opportunity to study the amount of water lost, the amount of soil washed, and the nutrients they contain.

Thanks to the installed device, the study of washouts caused by rain and flood waters was carried out for 2 years.

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