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Research Article

# Agroecological Condition of Pasture Lands of Azerbaijan in the Conditions of Gobustan Administrative District and Ways to Solutions to the Problem

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## Abstract

Study of simple, complex mineral fibers under crops on eroded soils of various mountain and foothill zones of the republic and their influence on the size, development, and productivity of the plant against the background of improving the fertility of the affected land. Over the past 30 years, quite valuable material has been collected from studies in other CIS countries. However, the physiological and biochemical bases of various types of mineral fertilizers have not been studied under grain crops on eroded lands of the country. The study of the problem of illumination of this issue was devoted to the results of studying the physiological and biochemical bases of microelements on the background of simple, complex fibers and complex tubes under arable grasses of autumn variety in moderately eroded, degraded brown soils in the south-eastern part of the Greater Caucasus.

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## Introduction

The problem of rational use of land, which is the main tool of production for agriculture and an increase in food production, has been faced by agricultural science. The lands of the mountain zone are an excellent source of resources for increasing agricultural production. In general, anti-erosion measures should be taken for the effective use of soil cover in mountainous areas, as well as on the south-eastern slopes of the Greater Caucasus.

This is explained by the fact that the erosion process is widespread here due to inaccurate economic activity in complex geomorphological conditions.

As a result of the soil erosion process, which has been formed over many years, the soil is destroyed, the fertility deteriorates, the amount of nutrients decreases, and their mobility is significantly limited.

In eroded soils, the amount of decay is significantly reduced, its fractional composition deteriorates, and the volatile part of humic acids, which are of agronomic value, decreases. Thus, the erosion process negatively affects the main parameters of the humus formation process in soils.

The erosion process also weakens all biochemical, enzymatic processes occurring in the soil and the intensity of carbon dioxide ($CO_2$) export. The erosion process also worsens the microbiological process, which is one of the main factors of soil fertility.

Soil microfiber is a decisive factor in the biochemical processes occurring in it and regulates the synthesis and mineralization of these processes, especially humus. In general, as a result of the erosion process, the physical, agrochemical properties of soil water and the food regime deteriorate. As a result, the yield of crops decreases.

This, in turn, hurts the biology of our planet. The use of mineral fertilizers is of great importance for increasing the fertility of eroded soils, along with other agrotechnical measures for the production of basic and high crops from agricultural plants.

The use of fertilizers on eroded soils in the mountainous and mountainous foothills of Azerbaijan does not meet the demand. Here, the physiological and biochemical bases of the use of mineral fertilizers, especially microelements, have been studied, and, therefore, the scientific basis for the fertilizer system for basic crops in eroded soils has not been developed.

Thus, the use of fibers in eroded soils is spontaneous.

Naturally, this rather indicates an increase in yield and improvement in the quality of crops. Scientific research was devoted to the above issues.

## Purpose of the study

Before the study, the following issues were resolved:

1. To study the fertility of degraded brown soils subjected to erosion and untreated, to determine the effect of erosion on soil fertility parameters.
2. To study the effect of differentials and proportions of fibers.
3. To study the influence of microelements (nickel, zinc, copper, iron, manganese, and molybdenum) on the amount of mineral fertilizers in soils.
4. Soil erosion by nitrogen, phosphorus, and potassium in mineral fertilizers.
5. The influence of macro and microspheres on the amount and dynamics of microelements in these lands.
6. To study the role of humus in the erosion of lands from mineral fibers and microelements.
7. Studying the influence of minerals and microbubbles on biochemical and physiological processes in the plant.

Surface of the mineral fiber and microelements: Effect on final productivity. On the southeastern slopes of the Greater Caucasus, simple mineral fertilizers and their effect on microelements on the background, development, and productivity of the scarlet plant on moderately eroded, degraded brown-brown soils in the Shamakhi region were studied.

Not with it is better to experiment with the herbaceous plant in soils. Thus, the herbaceous plant is considered a valuable ameliorant for restoring the fertility of eroded soils.

## Object and methodology

The object of the study was winter pastures located in the territory of Shamakhi, their main soils, and vegetation.

Soil erosion studies conducted taking into account the experience of subsoil use in the gray-brown area of \u200b\u200b dangerous erosion of gray rocks in the study area were analyzed, and an agroecological assessment was carried out based on generally accepted methodology.

Khashan grass is an indispensable source of protein for animals, and it is also important to study the comprehensive proposal of the study. The experimental testing base of the Institute of Erosion and Irrigation was built in the Malkham area of the Shamakhi region. The graph of the experimental scheme is not necessarily shown.

Phonological observations and biometric measurements have shown that the use of mineral fibers in the soil increases the amount of nutrients in it, which significantly increases the biological and microbiological activity of the soil.

All this in itself made it possible to ensure the normal development of the plant. As can be seen from the in Table 1, while in the control variant the height of the crown was 53.4 cm, the size of the plant increased by 2.4-15.7 cm.

Compared to the control (optional) option, the plant size increased by 21.4 - 23.9 cm in the variants with microelements.

The maximum increase per hectare was in the N90P90K90 kg and 3 kg manganese and zinc variants. In these variants, the relative bark size was 15.7, 23.9, and 23.0 cm, respectively.

Apparently, with the experimental choice, the surface mass of the plants increased significantly, which led to an increase in yield.

In this table, the figures show raspberry grasses increased by 10.9 - 24.1 centners per hectare, with 87.5 centners per hectare. The maximum increase was achieved when giving a hectare of $N_{90}P_{90}K_{90}$ kg.

Practice options: You get productivity from every hectare (sentner). Increase

NCP 0.5 = 12 thousand.

Sx% = 5.57% (24.1 quintals).

Using micronutrients against the background of simple tubes (N60P60K60 kg) further increased productivity.

a-Emergence of fruit tree crops; b-plant foliage growth cycle in the field; c-grinding in practice (Figure 1).

**Table 1:** Stones from mineral fibers and microelements of the longitudinal action of the beetle.

| Practice options | 29 / U length of the pike (cm) |
|---|---|
| Control (without crawling | 53,4 |
| $N_{30}P_{60}K_{30}$ | 55,8 |
| $N_{60}P_{60}K_{60}$ (background) | 63,3 |
| $N_{90}P_{90}K_{90}$ | 69,1 |
| Background + 3 kg / ha Ni | 74,8 |
| Background + 3 kg / ha Co | 76,0 |
| Background + 3 kg / ha Mn | 77,3 |
| Background + 3 kg / ha Zn | 76,4 |

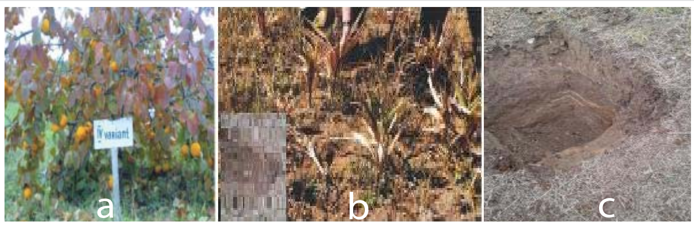


**Figure 1:** Fragments from the practice area.

As can be seen from the figures in Table 2, rice yield increased by 21.4 - 25.9 quintals per hectare compared to the decaffeinated variant. The maximum increase was achieved in hectares of 3 hectares of cobalt and zinc. In these variants, the increase was 25.3 - 25.9 quintals, respectively.

Mathematical processing of product numbers (according to Dospeksov) showed the integrity and accuracy of the experiment.

The effect of mineral fibers and microelements on the quality indicators of plants. The results of many scientific studies have shown that mineral fibers, as well as microelements, significantly improved the productivity and quality of perennial herbaceous plants [1-10].

As is known, the quality of forage plants depends on the quality of livestock products. Improving the quality of grasses is especially important for eroded soils.

This is because the quality of crops has significantly deteriorated in recent years. In the year of the study, the total content of nitrogen, phosphorus, potassium, and crude protein was analyzed in plant samples taken from experimental options (from the grass plant).

The determination methods for total nitrogen, phosphorus, and crude protein will be added under the *Methodology* section. Specifically, nitrogen was determined using the Kjeldahl method, phosphorus was measured by colorimetric analysis (molybdenum blue method), and crude protein was estimated by multiplying total nitrogen by the standard conversion factor (N × 6.25). These standard analytical approaches are well-established in soil and plant chemistry studies. The explanation will be supported with bibliographical references to provide transparency and replicability.

As can be seen from Table 3, the total nitrogen content in the samples taken from the coffee cake variants was 2.44%, total phosphorus 0.33%, total potassium 1.30% and crude protein 13.90%.

In the simple variants, the total nitrogen content is 0.11% - 0.38%, total phosphorus 0.05% - 0.14%, total potassium - 0.24% - 0.70%, crude protein - 0.63 - 2, increased by 17%.

In the variant issued per hectare $N_{90}P_{90}K_{90}$ kg, this increase was even greater.

**Table 2:** Influence of mineral fibers and microelements on final productivity.

| Practice options | You get productivity from every hectare (sentner) | Increase | |
|---|---|---|---|
| | | sentner | % |
| Control (without crawling) | 87,5 | 98,4 | 12,4 |
| $N_{30}P_{60}K_{30}$ | 98,4 | 10,9 | 15,54 |
| $N_{60}P_{60}K_{60}$ (background) | 101,1 | 13,6 | 27,5 |
| $N_{90}P_{90}K_{90}$Background)+3 kq/ha N | 108,9 | 24,1 | 24,5 |
| Background)+ 3 kq/ha Co | 112,8 | 25,3 | 28,9 |
| Background)+ 3 kq/ha Mn | 109,8 | 22,3 | 25,5 |
| Background)+ 3 kq/ha Zn | 113,4 | 25,9 | 29,6 |

**Table 3:** Influence of mineral fertilizers and microelements on quality indicators.

| Practice options | Total nitrogen, % | Crude protein, % | Common phosphorus, % | Total potassium,% |
|---|---|---|---|---|
| Control (without crawling) | 2,44 | 13,90 | 0,33 | 1,30 |
| $N_{30}P_{60}K_{30}$ | 2,55 | 14,53 | 0,38 | 1,54 |
| $N_{60}P_{60}K_{60}$ (background) | 2,68 | 15,27 | 0,44 | 1,76 |
| $N_{90}P_{90}K_{90}$ | 2,82 | 16,07 | 0,47 | 2,00 |
| (background)+ 3 kq/ha Ni | 2,84 | 16,18 | 0,47 | 1,76 |
| (background)+ 3 kq/ha Co | 2,91 | 16,58 | 0,48 | 2,40 |
| (background)+ 3 kq/ha Mn | 2,87 | 16,35 | 0,47 | 2,60 |
| (background)+ 3 kq/ha Zn | 2,82 | 16,07 | 0,47 | 2,00 |

When applying microelements against the background of simple fibers, the ratio of caffeinated variants to total nitrogen is 0.38% - 0.47%, total phosphorus 0.14% - 0.15%, total potassium 0.46% - 1.30%, crude protein 13 an increase of 2.17% - 2.45%.

The greatest increase was achieved in hectares of 3 kilograms of cobalt and manganese.

# Results

The following results correspond to the following studies:

1. Mineral fibers and microelements improve the nutritional balance of eroded brown mountain-brown soils and ensure normal development of hawthorn.
2. Mineral fibers and microelements significantly increase the biological, microbiological, and enzymatic activity of eroded soils.
3. Mineral fibers and microelements increase the production of scaly plants on moderately eroded gray-brown soils and significantly improve the quality of the product.

# Discussion

The findings of this study demonstrate that the application of mineral fertilizers in combination with trace microelements significantly improved both the productivity and quality of forage crops grown on moderately eroded brown soils. The increase in total nitrogen, phosphorus, potassium, and crude protein content highlights the essential role of balanced nutrient management in restoring soil fertility and ensuring sustainable plant growth. This result is consistent with earlier work emphasizing the positive impact of balanced NPK fertilization on crop yield and soil quality [3,9]. In particular, the observed rise in crude protein content underscores the importance of nitrogen supply for the nutritional quality of forage crops, as previously reported in studies on grassland productivity [10].

Moreover, the inclusion of microelements such as zinc, manganese, and cobalt led to notable increases in yield and protein levels, corroborating findings that micronutrient supplementation enhances biochemical processes and enzymatic activity in soils [8]. The role of these trace elements is particularly relevant for eroded soils, where natural reserves of nutrients are often depleted, thereby limiting crop performance. This aligns with broader agronomic literature, which has shown that micronutrient management is essential for sustainable intensification of degraded lands.

Overall, the results confirm that integrated nutrient management combining macro- and micronutrients can restore the fertility of eroded soils, enhance crop productivity, and improve forage quality. These findings provide a strong basis for developing region-specific fertilizer recommendations aimed at improving both soil health and livestock feed quality.

## Conclusion

This study confirms that the application of mineral fertilizers enriched with trace microelements significantly improves soil fertility, crop productivity, and forage quality in moderately eroded brown soils of Azerbaijan. The increase in total nitrogen, phosphorus, potassium, and crude protein levels demonstrates that balanced nutrient supply directly enhances both yield and nutritional value. These outcomes are consistent with global research advocating integrated nutrient management as a pathway to sustainable agriculture [3]. The results support the adoption of targeted fertilizer strategies to restore degraded soils and ensure long-term food and feed security.

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