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GEOBOTANICAL RESEARCH OF THE GRAZING LANDS IN PIRSHAGI SETTLEMENT: PRODUCTIVITY AND SUSTAINABLE MANAGEMENT STRATEGIES

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Abstract

This research focuses on the species composition and productivity of the scrub-grass vegetation, specifically the *Tamarixeta-Artemisietum-Alhagiosum* formation, in the grazing lands of Pirshagı settlement, located in the southern part of the Absheron Peninsula, Azerbaijan. The study examines the influence of anthropogenic and technogenic factors on the productivity of these lands, providing essential insights for their sustainable management. Field surveys were conducted on June 26, 2025, to assess the structure of the vegetation, identify the dominant and subdominant species, and calculate the dry biomass of different botanical groups. The productivity of the vegetation was recorded at 8.5 kg/ha, with legumes contributing the highest biomass (49.4%). The research emphasizes the importance of geobotanical studies for the efficient management of natural forage lands, particularly in suburban pastures [8]. The study also highlights the necessity of applying sustainable practices, such as rotational grazing and land restoration, to improve productivity and preserve the ecological balance [16]. The findings have practical implications for restoring degraded lands, enhancing forage plant growth, and promoting the conservation of endemic species, contributing to the long-term sustainability of the Pirshagı grazing lands [3].

Keywords*: Geobotany; cadastre; productivity; ecosystem; ecological balance; formation*

2. Materials and Methods

Study Area and Materials

The study was conducted in the Pirshagı settlement, located in the southern part of the Absheron Peninsula along the Caspian Sea. The primary research area encompasses the scrub-grass vegetation found in the general-use grazing lands of the Pirshagı municipality [2]. The field research was carried out on June 26, 2025 [6].

Research Objectives

The key objectives of the research included:

To record the species composition and structure of the plant formation during field research [5];

To provide an initial classification of the vegetation on the land-use plan for state land accounting at a scale of 1:50,000;

To study the dominant and subdominant species of the vegetation cover, as well as endemic plant species

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[16];

To collect samples for determining the productivity of the scrub-grass vegetation [12];

To collect and systematize herbarium specimens;

To develop comprehensive strategies for the efficient utilization of the grazing land based on the results of field and laboratory phytosociological research [1].

Research Methods

The research applied geobotanical principles and methodologies [8]. These principles were used to assess the species composition and productivity of the vegetation in the Pirshagı grazing lands, which are located along the Caspian Sea on the southern part of the Absheron Peninsula.

Field Research and Sample Collection

Field studies were conducted along the Pirshagı-Kurdachanı highway, near the "Ömər Equestrian Center," where scrub-grass vegetation is found in gray-grass soils [15]. Biomass samples were collected from various research sites using the mowing method. The samples were collected three times to ensure consistency and to accurately evaluate the productivity and structure of the vegetation [11].

Plant Classification

Species were classified based on the Flora of Azerbaijan, using systematic taxonomy (family, genus, species) as referenced by S.K. Cherepanov, A.M. Asgarov, V.C. Hajiyev, and T.E. Gasimova. Herbarium specimens were classified based on these systematic taxa.

Productivity Measurement

The productivity of the vegetation was determined by measuring the dry biomass of botanical groups in kilograms per hectare (kg/ha) [15]. The biomass samples were collected in three separate instances, and the total productivity was calculated by summing the dry biomass of each plant group. The productivity was then calculated as an average for the sites sampled, based on dry biomass [3].

Assessment Methods

Statistical methods were used to assess the results of the research. Biomass, productivity, and species composition were evaluated using appropriate statistical techniques to ensure accurate and reliable data [11]. The results were compared with previous studies to ensure consistency and to evaluate the effectiveness of sustainable grazing practices [12].

Reliability of the Study and Data Accuracy

The reliability of the study was ensured by standardizing the sampling methods and conducting repeated measurements for biomass and productivity [7]. Statistical analyses were performed to ensure the accuracy of the results. The research methods used were validated by comparing the data with previous studies on similar ecosystems**.**

Classification of modern phytosociological vegetation

I. Vegetation of the dry subtropical semi-desert zone, introzonal vegetation spreading in gray-grass soils.

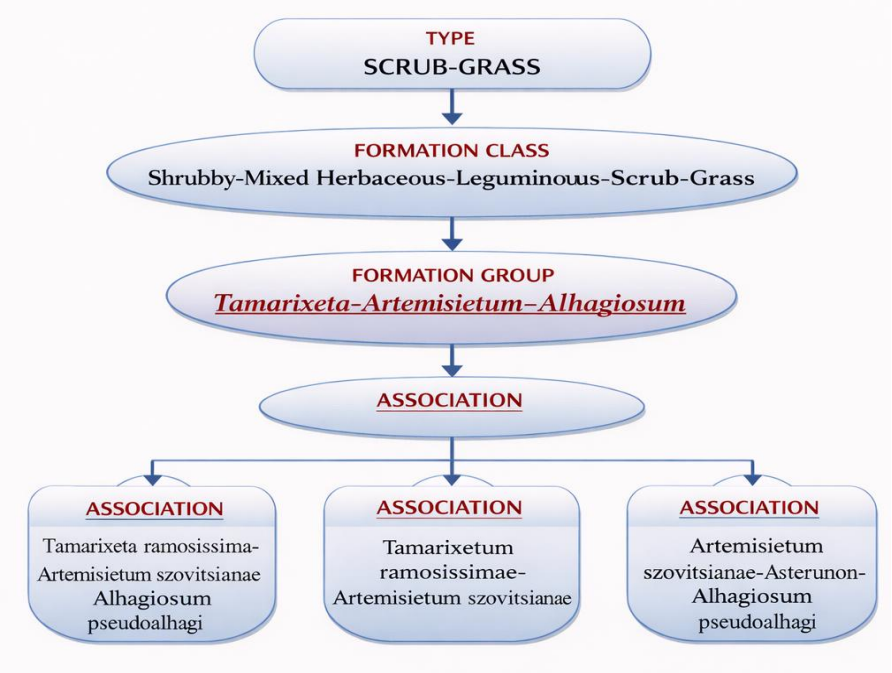
Type: Scrub-Grass

Formation Class: Shrubby-Mixed Herbaceous-Leguminous-Scrub-Grass

Formation Group: *Tamarixeta-Artemisietum-Alhagiosum*

Association:

1. *Tamarixeta ramosissima–Artemisietum szowitsianae–Alhagiosum pseudoalhagi*
2. *Tamarixetum ramosissimae–Artemisietum szowitsianae*
3. *Artemisietum szowitsianae–Asterunon–Alhagiosum pseudoalhagi*



As seen from this classification scheme, the studied vegetation type, formation class, group, and three associations are included. The productivity of the *Tamarixeta- Artemisietum-Alhagiosum* formation has been determined at the research sites. In this regard, in the typical area, samples were taken three times using the mowing method according to botanical groups, and productivity was calculated based on dry biomass.

3. Results and Discussion

The geobotanical research in the Pirshagı settlement's grazing lands revealed significant findings regarding the species composition, structure, and productivity of the scrub-grass vegetation. The study identified the dominant plant species and their corresponding productivity rates, which are crucial for assessing the quality and sustainability of the grazing lands [8].

The *Tamarixeta-Artemisietum-Alhagiosum* formation was found to be the primary vegetation type in the area. The productivity measurements were taken from different botanical groups: *Gramineae* (grasses), *Leguminosae* (legumes), and miscellaneous herbs. The results of the productivity analysis were as follows:

Table 1. Productivity of the Formation (in Edible Biomass) on June 26, 2025

Botanical Groups	**Dry Biomass (kg/ha)**	**Percentage (%)**
Gramineae	1.7	20
Leguminosae	4.2	49.4
Miscellaneous Herbs	2.6	30.6
Average Productivity	**8.5**	**100**

From the above table, it is clear that legumes (4.2 kg/ha) contribute the most to the total biomass, followed by miscellaneous herbs (2.6 kg/ha), and grasses (1.7 kg/ha). The total productivity of the vegetation in the

study area was found to be 8.5 kg/ha. This data suggests that the Pirshagı grazing lands have moderate productivity, with legumes playing a crucial role in maintaining the biomass levels [7].

The research also identified the species composition, which included both common and endemic plant species. Some species of particular ecological and economic importance were noted for their contribution to the productivity of the grazing lands. These species, particularly the legumes, were essential for maintaining the ecological balance and supporting sustainable grazing [1].

The results of the geobotanical study confirm that the Pirshagı settlement's grazing lands have moderate productivity, with legumes making the most significant contribution [13]. However, the study also highlights the negative impacts of anthropogenic and technogenic activities on the land's productivity. Overgrazing, soil erosion, and human-induced land degradation have reduced the vegetation's overall health and productivity [4]. This observation is consistent with other studies [13] that have shown how improper land management can lead to the deterioration of grazing lands.

The finding that legumes constitute the highest biomass is notable. Legumes are essential in agricultural systems because they can fix nitrogen in the soil, enriching it and improving its fertility [10]. This characteristic is particularly important in maintaining soil health and ensuring long-term productivity.

However, the low productivity of grasses (1.7 kg/ha) suggests that there may be a lack of effective management practices in place [14]. Inadequate grazing systems and poor soil management may be contributing to this low productivity. The degradation of soils, especially in areas with intensive grazing, leads to a decrease in the available nutrients for grasses, which are vital for maintaining the productivity of grazing lands [12].

The recommendations based on these findings emphasize the importance of implementing sustainable land management practices. These include the use of rotational grazing, restoration of degraded areas with appropriate forage plants, and the application of organic and mineral fertilizers to improve soil fertility [3] Previous research has also supported the need for a more sustainable grazing system, highlighting the importance of controlling grazing pressure and ensuring the protection of native and endemic plant species [11].

4. Conclusion

The geobotanical research conducted in the Pirshagı settlement's grazing lands provided valuable insights into the species composition, structure, and productivity of the scrub-grass vegetation. The study found that the *Tamarixeta-Artemisietum-Alhagiosum* formation is the dominant plant formation in the area, and legumes contributed the most to the overall biomass production. However, the productivity of these lands is moderate and has been negatively affected by anthropogenic and technogenic factors, including overgrazing and soil degradation.

The study's findings emphasize the need for sustainable land management practices to improve the productivity and ecological health of these grazing lands. Key recommendations include implementing rotational grazing systems, restoring degraded areas with perennial forage plants, and enhancing soil fertility through the use of organic and mineral fertilizers. Additionally, the protection of endemic and rare plant species is essential to maintain biodiversity and ecosystem stability.

Overall, the research demonstrates that geobotanical studies are crucial for assessing the health and productivity of grazing lands, providing a scientific foundation for the sustainable management of natural resources. By adopting the strategies proposed in this study, it is possible to improve the ecological balance, enhance land productivity, and ensure the long-term sustainability of Pirshagı's grazing lands.

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