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Biosenological Researches in the Semidesert Landscape of the Azerbaijan Republic Gobustan Massive

Matanat Mirismayil Aliyeva*

Institute of Soil Science and Agrochemistry of ANAS, Baku, Azerbaijan

Abstract

The problems of landscapes investigation, the resources account and rational utilization under intensification of the antropogen effects on natural complexes assume an important practical significance during assessment of the biospheric functions at a period of transition to the new economical relations in agriculture [10]. From this point of view a contemporary bioecological character of the semidesert landscape vegetation in the Azerbaijan Gobustan massive was investigated. It was determined 2 subtypes of the Gobustan massive semidesert landscape extended: a semidesert landscape of the low mountainous and a semidesert landscape of the accumulative plain. As a result of the carried out researches the following pasture types of the semidesert plantation were determined over grey-brown soils in the Gobustan winter pastures: 1) wormwoody-gengyz (25041,0 h); 2) wormwoody- peashrub (28675,0 h); 3) wormwoody-fragile saltwort-gengyz (6049,0 h); 4)wormwoody-sea blite (2132,0 h);5) sea blite-ephemer (12085,0 h). According to the geobotanical researches the wormwoody (*Artemisia meyeriana*)–gengyz (*Salsola nodulosa*) formation possesses the highest productivity-4,95 c/h.

Keywords

Gobustan Massive, Semidesert Landscape, Plant Productivity, Wormwoody-Gengyz form Ation

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1. Object and Method of the Research

The under pasture soils in the Gobustan massive taken as a research object. A total area of the zone is 120970 hectares. The winter pasture area forms 76875 hectares. In connection with the research work for fulfillment of the duties put before the main soil types and subtypes and supporting stations in plant phytosenozes over them were selected and the field researches were performed in 2013-2014. While investigating the vegetation the following methods were used during phytocenozes botanical character, the fodder areas productivity, geobotanical and cultural-technical researches: Bogdanov M.P. [3], Iglovikov and others [4], L.G.Ramensky [17], I.A.Tsasenkin [16].

The surface plant mass calculation was performed by a mowing method, the beds in a size of 10x10 m and 10x20 m were distinquished depending on phytosenoz grass cover state, for identification of the surface biomass productivity the ephemers, wormwood and-saltwort (*Salsola ericoides*) annual trunk at a height of 2 cm from surface was reaped by a hand method. The ephemers productivity was studied in April-May, but wormwood- saltwort (*Salsola ericoides*) productivity in November-December. The productivity account was conducted by 3 secondaries in 1-2,5 m^2 of areas.

For definition of the pasture botanical composition from the reaped grass mass and forage chemical analysis the samples were separated. A dry weight of these samples was identified and productivity was determined on the basis of

* Corresponding author
E-mail address: Matanat.aliyeva@yandex.ru

the drying coefficient.

The following biochemical analyses were performed in the taken plant samples: wet ash-by a burning method; raw protein-by a Keldal method, raw oil-by a Saksalet apparatus, cellulose-Kirshner and Ganek, hygroscopic hymidity and nitrogenless extract substances-by a calculation.

The initial maps about soil and plant cover of the research zone were got and they are used as a base in the maps composition. A plant map on a scale of 1:50000 in the Institute of Ministry of Agriculture SR Fodder science, meadow cultivation and Pastures and Forage Unit map of the Gobustan winter pastures on a scale of 1:50000 was prepared on the basis of the geobotanical researche consequences.

2. Analysis and Discussion

The Gobustan landscape was thoroughly studied by Lylienberg D.A.[9], Omarova Kh.I.[14], Budagov B.A. [1], Mikailov A.A. [2], Bogdanov M.P. [3], [Huseynova F.A. [8], Dashdamirova E.R. [5] and others [6,15]. While performing the South-Eastern Caucasus landscape regionalization by B.A.Budagov, A.A.Mikayilov [2], the Gobustan massive was thoroughly investigated and its possessing a complex structure was revealed. To B.A.Budagov's classification the 2 types of the semidesert landscape over the Gobustan massive were developed: low upland semidesert landscape (over the grey-brown soils) and accumulative plain semidesert landscape (on grey-brown soils).

2.1. Semidesert Landscape of the Low Upland

This landscape complex occupies a large area in the low mountainous part of the Great Caucasus south slopes. The relief shattered intensively, being, hilly-wave-like it is characterized by a weak development of the river et and thin plant cover. The gley, sand, loamy and mud-volcano breccias forma base of landscape litogen.

The landscapes of the zone the mud-volcanos located are especially distinquished from the environment. The landscapes change occurs depending on slopes height and exposition, on mud-volcanos periodicity, age, breccias salinity. Peashrub (*Salsola dendroides*)-gengyz (*Salsola nodulosa*) developed in the slight shattered young breccias flowsonthe volcano slopes, gengyz-ephemer plant assosistions developed in the ancient breccias. It is known that the mud-volcanos create high cones (400-450 m), their slopes shattered strongly as a result of the intensive aridity and mainly badlands spreaded [3]. The badlands are mostly found on the south, south-eastern slopes. The soil-plant cover on such slopes are usually noticed as separate sports developing very weakly.

The plant cover diversity is observed in the low mountainous semidesert landscape and this depends on microhumidification of slopes, lithogen base and other reasons. The ephemer-wormwood developed on the north slopes, wormwood- gengyz, wormwood-ephemer plant complexes developed on the south slopes. The semidesert plant developed on the grey-brown soils of the Gobustan massive formed 81095,0 hectares of the winter pastures. 63375,8 h of the these winter pastures are clean pastures (78%), 6177,5 h (7,62%) bushy pasture, 11541,7 h (14,23%) stony pasture. The most stony pastures are met in the thin (2476,4 h) and mean thicky (5346,7 h) grey-brown soils.

We determined 8 plant formations developing on the grey-brown soils of the Gobustan winter pasture areas based on the geobotanical researches and collected fund materials being fullfilled by us in 2013-2014: 1) wormwoody - ephemer (805,0 h); 2) wormwoody - fragile saltwort - gengyz (1210,0 h); 3) peashrub - wormwood (9678,0 h); 4) fragile saltwort - peashrub - wormwood (2729,0 h); 5) sea blite - fragile saltwort - wormwood (2118,0 h); 6) fragile saltwort – gengyz – wormwood (1252,0 h); 7) fragile saltwort - gengyz - ephemer (5675,5 h); 8) gengyz - wormwood (2661,0 h).

The pasture areas extended on the slopes in connection with the possession of complicated orography in Gobustan. These pasture areas in a vertical direction rise till 500 m from the sea level. The plant cover of which slope inclination is 20^0 possesses homogeneous composition, the plant cover of the slopes possessing $20\text{-}45^0$ in unhomogeneous, they are distinquished by phytocenoses content and structure. Gengyz plant having a hard root system on the more leached vertical slopes develops. Covering of the soil surface with the plant form 60-80% on the slight inclined slopes, 20-30% on the vertical slopes depending on the slopes inclination.

The semidesert plants botanical structure spreading over grey-brown soils are given as generalized structure over 8 plant assosiations: by 3-4 score- *Hordleum leporinum; Artemisia fragrans; Lolium rigidum; Eremopyrum triticeum; Eremopyrum orientale;* by 2-3 scores - *Zerna rubeus; Kochia prostrata; Artemisia caucasica; Salsola cemmascons;* by 1-2 scores -*Medicago minima; Allium rubellum; Alyssum desertorum; Phalaris minor; Aegilops triuncialis; Poa bulbosa; Agropyron elongatiforme; Colpodium humile; Tragopogon graminifolius; Bromus japonicus.*

2.2. Semidesert Landscape of the Accumulative Plain

According to B.A.Budagov [2] the natural-zonal complex spreaded in the large accumulative plains of the south-eastern Caucasus is a semidesert landscape, this complex occupies the heights from 20 m to 250-300 m. Along the Caspean, Shirvan and Gobustan the relief is hilly, blocky and it is characterized by the plains between them. Its formation is connected with the accumulative and abrasion accumulative action at the fourth period of the Caspean sea. Depending on climatical and lithological characters the soil cover is very salinized here, salines extended in the valleys and hollows deposit. The mud-volcanos also act along the Absheron-Gobustan shore, that it causes salinization of the surrounding zone soils.

In some cases, the meadow, meadow-boddy complexes extended over upper fourth period and present alluvial precipitations in the river deposits. Such complexes are found in the hollow parts of the relief where subsoil waters level is high. The pasture areas which are created by phytocenozes developing over the Gobustan under pasture grey-brown soils are 20467,5 h. From them 18281,2 h (89%) is a clean pasture,375,0 h (1,83%) is a bushy pasture, 1811,3 (8,85%) is stony pasture. The stony pasture forms 14,38% (811,3 h) in the primitive grey-brown soils, 6,74% in the grey-brown soils.

As a result of the researches the following pasture types of the semidesert plant were determined on the grey-brown soils of the Gobustan winter pastures: 1) wormwoody - gengyz (25041,0 h); 2) wormwoody-peashrub (28675,0 h); 3) wormwoody - fragile saltwort - gengyz (6049,0 h); 4)) wormwoody - sea blite (2132,0 h); 5) sea blite - ephemer (12085,0 h).

Fragrant wormwood *(Артемисиа фраэранс)* and ephemers participate as semidesert plant edificators of the Gobustan winter pasture plant. Saltwort (*Salsola ericoides*) and saltresistant plant sorts dominate in the less, more salinized zones. On the upper stratum is formed from different xerophyl semibushes (saltwort and wormwood) in semidesert plant. The second stratum is represented by annual saltwort (*Salsola ericoides*, *Petrosimonia genus*), the 3rd stratum is represented by ephemers, the 4th layer is represented by the primitive plants. From the economy point of view the stratum which is formed by ephemers is valuable, the first stratum plays a insurance role in the winter pastures and the ephemers are eaten by the cattle when they are covered by snow in winter [11].

As a result of the analyses of the conducted researches and reference materials Holocnemum (*Holocnemum strobilaceum*), potash plant ((*Kalidium caspicum*), subshrub sea blite-potash plant (*Suaeda dendroides, Kalidium caspicum*)) improve in the saline soils Petrosimonia genus (*Petrosimonia brachiata)*) in the solonetzic soils, wormwood ((*Artemisia meyeriana*)) in the weak salinized grey-brown soils, wormwood-saltwort *(Salsola ericoides)* develops in the grey-meadow and solonetzic soils, gengyz (*Salsola nodulosa*) and wormwood-gengyz (*Salsola nodulosa*) formations develop in the solonetzic soils, peashrub (*Salsola dendroides*), and wormwood-peashrub formations develop in grey-meadow and solonetzic grey-brown soils, is-segek - Petrosimonia *(Anabasis L., Petrosimonia brachiata)* solonetzic soils, is-segek-peashrub in the meadow and solonetzic grey-brown soils, wormwood-Fleshy saltwort (*Artemisia meyeriana, Salsola crassa B.)* develop in the solonetzic soils [14].

The semidesert plant development isn't the same. The ephemer plants begin to dry seeding approximately at the end of May. During the whole summer the grey semidesert is in a lifeless form, but the wormwood and saltwort bushes remain alive and weakens their development. The ephemers revive by the autumn rains again, every where become green, at this time the wormwood begins to blossom. In winter the ephemers development weakens, in spring the ephemers strongly develop during 30-45 days, blossom and yield. The ephemers root system doesn't go into depth (25 cm) and is nourished on the atmospheric rainfalls [12]. The following plant sorts enter the ephemer semens in the wormwood semidesert plant *Eremopyrum triticeum, Aegilops cylindrica, Bromus japonicus, Zerna rubeus, Hordeum leporinum, Eremopyrum orientale.*

The perennial ephemeroids *Poa bulbosa, Colpodium humule* can be concerned this group, they play an important role in a food-stuff of the winter pastures [7].

To give a botanical structure of the semidesert plant developed in grey-brown soils we give a botanical grass structure of the wormwood-ephemeric plant formation reflecting the main edificators of the large extended semidesert plant in the zone (table 1). The wormwood-ephemeric plant formation botanical structure was formed from17 flowering plants. Here include one-sort (5,9%) semibush, 8 sort (47,06%) grain grass, 1 sort (5,9%) leguminous and 7 sort (41,18%) diverse grass.

The project cover forms 60-80% in the plain and slight inclined plain areas, 20-40% in the shattered hillock plateau. A mean height of the grass cover is 10-30%. A dominant of the wormwood-ephemeric formation is considered fragrant wormwood (3 scores) and hare-barley (3-4 scores), subdominant redden bonfire (2-3 scores).

Table 1. Botanical sort structure and content of the wormwood-ephemeric plant formation

N/n	Name of the plant sorts	Richness (by a score)	Mean height (by cm)	Phenological phase
	Semi bushes			
1	Salsola dendroides	1	40-60	Vegetation
	Grain grass			
	Ephemers:			
2	Hordeum leporinum	3-4	10-20	Blossoming
3	Zerna rubeus	2-3	10-15	Blossoming
4	Zolium rigidum	1-2	15-30	Blossoming
5	Hordeum hystrix	1-2	10-15	Blossoming
6	Aegilops biuncialis	1-2	5-10	Blossoming
7	Avenafatua	1	15-20	Blossoming
	Ephemeroids:			
8	Roa bulbosa	1-2	10-25	Blossoming
	Leguminous plants:			
9	Medicago minima	2-3	5-10	Bean ripening
	Diverse grass:			
10	Artemisia fragrans	3	15-25	Vegetation
11	Alyssum desertorum	1-2	5-15	Blossoming
12	Tragopogon graminifolius	1	4-8	Blossoming
12	Erigeron Canadensis	1	5-10	Blossoming
14	Teucrium polium	1	4-8	Vegetation
15	Filago Spathulata	1	5-10	Blossoming
16	Cursium arvense	1	6-12	Blossoming

The productivity of the accumulative plain semidesert plant developed in grey-brown soils (table 2) changes from 5,54 cent/h (sea blite-ephemeric formation) to 6,97 cent/h (wormwood-gengyz formation).The average productivity of the plain semidesert pastures is 6,57 cent/h (Table 2).

Table 2. Productivity of the Gobustan massive plant cover over phytocenozes

N/n	Phytocenozes	Productivity (for dry mass) cent/h		
		Spring	Autumn	Total
1	wormwood-gengyz	4,95	2,02	6,97
2	wormwood-ephemeric	4,89	1,92	6,81
3	wormwood-saltwort - gengyz	4,19	1,72	5,91
4	wormwood- sea blite	2,56	3,71	6,31
5	sea blite-ephemeric	3,17	2,37	5,54

As is obvious from the table the wormwood-gengyz formation possesses the highest productivity. These phytocenoses were represented by the ephemers besides xerophit semibushes-wormwood-gengyz and saltwort. These pastures are considered the best pasture types. Besides a rich ephemer content the gengyz also possesses a high forage quality, the cattle readily eat at the end of autumn and in winter, especially it assumes a great importance in winter.

The consequences of the biochemical analyses being performed for definition of the forage quality indications in the grey-brown soils semidesert plant are shown on Table 3.

Table 3. Main biochemical parameters of phytocenozes

N/n	Formations	Total humidity	hygroscopic hymidity, %	In absolute dry substance,%					In 100 кg fodder		In 1 кg of fodd	
				Ash	Protein	Oil	Cellulose	NES	Fodder unit	Assimilated protein, by-gr	Fodder unit by kg	Assimilated protein, kg
1	wormwood-gengyz	30,56	10,41	14,12	9,66	3,77	37,94	34,51	35,85	4,8	0,36	0,48
2	wormwood-saltwort - gengyz	31,43	10,24	14,05	9,03	3,70	37,15	35,81	35,92	4,5	0,36	0,45
3	wormwood-ephemeric	33,67	10,65	13,38	8,62	3,64	38,3	36,06	35,95	4,3	0,36	0,43
4	wormwood-sea blite	37,65	10,66	13,12	8,92	3,97	37,89	36,09	37,52	4,5	0,37	0,45
5	sea blite-ephemeric	35,89	11,36	14,29	8,08	4,22	37,74	35,67	37,57	4,0	0,37	0,40

In each of 100 kg of dry-fodder which is obtained from semidesert phytocenozes in spring there is 47,3-53,1 kg fodder unit,4,6-6,1 kg of digestible protein, in autumn 35-37 kg of fodder unit, 4,0-4,8 kg assimilating protein.

3. Conclusion

The pasture areas the grey-brown soils semidesert plant develops in can be concerned the II and III categoric pastures in Azerbaijan Gobustan massive. A quantity of the cattle falling per hectare is recommended approximately 0,7-1,3 heads. A use period from semidesert pastures in grey-brown soils is by 15 Nowember-25 April, being 160 days.

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