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ECOLOGICAL EVALUATION OF SEMIDESERT PASTURE SOILS AND THEIR IMPROVEMENT

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Abstract. On the basis of the conduction of the agroecological evaluation and monitoring of the pasture soils in the Gobustan massif of Azerbaijan it was revealed that the semidesert landscapes occupy more than 67 % of the territory, but score of evaluation is very low-41(forty one) scores, an average productivity-6.05 centner/hectare of dry mass. It is connected with that dominating grey-brown soils of semidesert are weakly ensured with nutrient, macro- and microelements. After revealing of the main nutrient deficiency, including microelements in the pasture grass, the experiments were carried out over study of the effect of macro-and microfertilizers related to harrowing in 2 (two) marks on wormwood –ephemer productivity with the admixture of the pasture saltbushes, under this capacity the pastures rose 2 times, collection of exchangeable energy 108 %, the net profit was 399,6 manats /hectare.

Key words: agro-ecological, assessment, semi-desert, micro fertilizers, rangeland, pasture.

INTRODUCTION

The violation of the ecological balance in the nature under an influence of the natural and antropogenic factors sets the humanity before a real threat of the disappearance of the unique landscapes and biological sorts. Historically traditional district of the nomadic cattle-breeding – Gobustan winter pasture in that place of the South- Eastern part of the Great Caucasus where the mountain ranges pass into the low plateau and heights. Long intensive and unsystematic use of the pastures without the calculations of the ecological pecularities leads to aggravation of the biological diversity, development of the process of degradation and desertification.

At present the pasture soils are in the state property, are rented to farmers for different times, but any measures aren't conducted on their improvement. At the same time a total number of livestock in the republic grows firmly.

Owing to our calculation loading on semidesert pasture mustn't exceed 0.5-1.3 heads of sheep per hectare. However on statistics loadings increase a norm 5-6 times in fact. The complex study of the contemporary ecological state of the semidesert pastures under conditions of dry subtropic and revealing of the limiting factors with the purpose of their removal by means of optimization of the food and water-air regime in soils formed a main purpose of our investigations. The similar complex approach in study of the winter pastures is conducted in the republic for the first time. So for ex, microelementary and vitaminous composition of fodder which was studied by us [1] in the scales, enough for the application in cattle-breeding practice, used under calculations of provision of animal rations with the nutrient and ecological value of the pasture lands. For balancing of the animal rational feeding all-round study of chemical composition and forage nutritiousness under concrete conditions is necessary, so the local naturally –historical and economical conditions largely- stipulate specification of some or other nutrient accumulation in the plant [2]. That's why a value of the efficiency of microfertilizer application in the back ground of the optimum provision with the main nutrient on the winter pastures is highly actual problem. A definition of the sorts, combinations and doses of the mineral –macro-and micro fertilizers application under foadder crops in the background of harrowing in 2 (two) traces must promote increase of productivity and improvement of the food quality in our opinion.

The following tasks are undertaken before us in this connection:

1. Conducting of the ecological evaluation and monitoring of the pasture lands;

2. Calculating a degree of the provision of local vegetative fodder with the main nutrient being a part of the animals' ration.

3. On the basis of the carried out investigations to elaborate a rational system of mineral (macro-and micro) fertilizers in combinations with harrowing in 2 (two) traces with the following recommendations of production.

OBJECTS AND METHODS

Objects of research are the Gobustan winter pastures soils. The characteristic pecularity of the Gobustan massif's relief is a direction of the mountain rocks to the south –east, severe rarity, hillyness, poor vegetative and animal world. An experimental area is on the smoothing plateau, on the height of 100-150 m above sea-level. The river waters of the region belong to sulphatic, primarily sodium groups with the middle yearly mineralization more than 1000 mg/l. The middle yearly temperature of the air is 14.2^0-14.6^{0}C. A yearly distribution of the air temperature is characterized by minimum in January -3.4^{0}C and maximum in July-August -24.5^{0}C. The soil temperature on surface is 16^0-17^{0}C on average. Minimum (-15^0-20^{0}C) in a yearly motion falls in January, maximum (63^0-67^{0}C) in July. A quantity of atmospheric sediments in a half –desert zone vibrates in limits of 110-270 mm. An index of moisture changes in limits of 0.10-0.13. The humid cold north winds play a great role in the sediments distribution. A great number of the hot days in the summer period promotes intensive evaporation (1260 mm/year) and it causes drougtness. There are many heliowindy resources in the massif. The summary radiation is 130-135 ccal/cm^2, a temperature sum more than 10^{0}C vibrates in limits of 4000-4500^{0}C. In a period of June-August a quantity of the drought days reaches 55 (fifty five).

An experimental area is in the typical grey- brown soils that are weakly provided with the nutrient. On mechanical composition these soils are middle – loamy (< 0.001mm-47.81 %).Calcareous of the upper horizon is equal to 3-5 %, and from depth rises to 14.85 %.On horizon of 0-20 cm the humus composition vibrates in limits of 1.56-1.68 %,total nitrogen – 0.094-0.104 %; a quantity of the nitrogen combinations assimilated insignificanly by crops in soils. On the layer of 0-20 cm a composition of light-hydrolyzable nitrogen is 45-72 mg, absorbing ammiac - 4,2-4.6 mg; nitrate – nitrogen -4.8-6.1 mg/kg of soil. Total phosphorus on the layer of 0-20 cm, is 0.10-0.15 %; water-soluble - 1.0-1.6 mg/kg, but water soluble in 1 % of (NH_4) CO_3- 10.9-12.0 mg/kg of soil. Total potassium composition is 204-298 mg/kg of soil, pH 8.5-9.0. Soils weakly provided with manganese (1.5-5.1 mg/kg), copper (0.10-0.22mg/kg), zinc (0.11-0.24 mg/kg); middle-provided with cobalt (0.10-0.18 mg/kg), selenium (0.05-0.07 mg/kg) that are badly reflected on productivity of fodder crops and animals.

The results of the ecological monitoring conducted by us showed that an area under steppe landscape reduced from 22.7 % to 12 %, but an area under semideserts rised till 67 % for last 40 years, an agroproductive groupping of the lands showed that the land area of the best quality reduced 3 (three) times, a score of bonitet decreased from 92 to 86.

Productivity of steppe phytocenoz shortened from 14.8 c/h to 12.48 c/h, and semideserts from 9.74 c/h to 6.05 c/h.

The semidesert fodder lands are presented mainly by wormwood, wormwood-ephemer with the admixture of saltbushes(heath-like salt bushes, mountainous- salsola nodulosy saltbush). Besides perennial saltbushes one-year-winter-

grass and fat saltbush are found. 4(four) stages are distinquished in phytocenoz: 1) perennial saltbushes; 2) one-year saltbushes; 3) ephemers; 4) primitive plants. The main kinds of the warmwood – saltbushes and wormwood- ephemer types are warmwood, saltbushes, ephemers. These typical xerophyts, transfering heat and drought at the expense of the reduced evaporating surface of the leaf, boughness and deep root system in wormwood and saltbush reaching 8-10 m.

One-year saltbushes begin to vegetate in spring and continue during the whole summer. These are typical xerophyts. A root system of ephemers don't deeply (wholly 25 cm) go into soil and mainly nourish at the expense of sediments. Most of ephemers – one-year crops, but there are perennial plants. Ephemers are devided into winter and spring crops. We studied a composition of the crop cover of the area (Table 1).

As it is obvious by dominating sort of the sward is wormwood which is 39 % from total sward. Worm –wood is a main foothold food providing sheep-head in the winter period. During snow cover generative shoots which are on cover are eaten. In spring and summer wormwood isn't eaten for strong fragrant essential oil that is distinquished at this period. From cereals ephemer Poa bulbosa, hordeum leporinum, dominate, but among legume-lucerne it is little. Non–eaten weeds, abundance which excesses 5,0 % are noted among herbs (Table 1).

Table 1 – Compostion of the vegetative cover in the experimental area

№	Name (latin)	Height, cm	Abundance, %	Vegetation phase
1	2	3	4	5
Subshrubs				
1	Artemisia meyeriana	25	39.0	vegetation
2	Salsola ericoides	20	1.3	vegetation
3	Salsola dendroides	40	1.0	vegetation
Cereals				
4	Poa bulbosa	21	9.0	fruiting
5	Poa one year	18	7.0	fruiting
6	Bronus japonicus	24	7.4	fruiting
7	Bronus rubes	20	2.5	fruiting
8	Bronus tectorum	18	1.0	fruiting
9	Agropyron intermedium	28	1.6	fruiting
10	Hordeum leporium	16	7.6	fruiting
11	Phleum paniculatum	27	1.0	fruiting
12	Algilops cylindrica	16	1.3	fruiting
Legumes				
13	Medicago minima	5	6.0	fruiting
14	Filago Spathulata	8	1.0	blooming
Herb				
15	Erodium cicutarium	12	1.6	fruiting
16	F.germanica	14	0.5	fruiting
17	Scorzonera Cana	13	1.0	fruiting
18	Paraver	16	0.5	blooming
19	Allium rubellum	12	0.8	fruiting

Continuation of table 1

1	2	3	4	5
20	Alyssum desertorum	14	0.6	fruiting
21	Matricaria aurea	8	1.3	blooming fruiting
22	Sonchus arvensid	20	0.5	blooming fruiting
23	Hieracium ubellatum	14	1.0	blooming fruiting
24	Lampsana communis	18	0.6	blooming fruiting
25	Burleurum aureum	15	0.6	fruiting
26	Orobanche purpurea	10	0.1	blooming fruiting
27	Cirsium arvense	40	0.1	blooming fruiting
28	Cirsium lancelatum	30	0.1	blooming
29	Onoporden L.	9	1.0	blooming
30	Tencrium L.	6	1.0	vegetation
31	Erigeron L.	8	1.0	blooming
32	Tragopogon L.	6	1.0	blooming

Thus, we used from methods of the two directions-for achievement of the reseach purpose - methods for conduction of the ecological evaluation of the soil-landscape complexes, factors revealing, limiting reproduction, and ecosystem development and methods of the agrochemical researches for study of macro and microelements compositions and an effect of mineral fertilizers and other agrotechnical methods on the pasture productivity.

At the beginning of last century V.V. Dokuchayev [3] and H.M. Sybirtsev [4] very exactly formulated soil evaluation definition. Development of these ideas got their progress in many scientists works, including in I.I. Karmanov's [5], D.S. Bulgakov's [6]. Study of the scientific – theoretical and systematical bases of the ecological values in our republic was begun by academician G.Sh. Mammadov [7, 8] in 70 th –year of the last century. In S.Z. Mamedov's opinion [9] an appearance of the soil ecological value theory in the joint of the two parallel directions: «Soil ecology» and «Soil evaluation» were hystorically necessity.

The author prepared special appraisal scales on degrees of the soil separate trace displays according to ecological needs of plants, where some or other traces of the soil parameters get a value expressed in scores. An evaluation of the landscape complexes-the second stage (after soil evalute) of the pasture soil evaluation as a result of which the news about bonitet of the definite territories has been got. By the initial materials for the values the winter pasture landscapes serve soil-erosion map, landscape mas, soil bonitet scales served.

The charateristic soils were defined, the areas of soil contours were counted, their evaluate scores were established for each complex on these mateials. Medium weighting scores of the landscape complex were determined on formula (1):

$$B = \frac{a_1 b_1 + a_2 b_2 + ... + a_n b_n}{A} \quad (1)$$

Where B- mediumweigting score of the landscape complex bonitet; $a_1, a_2 ... a_n$- an area of the separate soil variety; A – a

total area of the territory (hectare); $b_1, b_2 \ldots b_n$- bonitet scores of soil variety.

At the same time the special evaluating scales on microelements composition and energetic nutritiousness of fodder plants were elaborated for definition of the total ecological score in the landscape complexes [10].

Thus, executing the first part of the researches, works on revealing of the ecological values in soil-landscape complexes from the Gobustan winter pastures and factors limiting improvement of the semi-desert landscapes –but it is deficiencies of nutrient, water and proper care for pastures in the first turn, the second part of our researches – study of the influence of macro and microfertilizers and harrowing on improvement of the pasture ecosystem on the whole and increase of its productivity in particular.

A calculation of the norms in macro-, microfertilizers is carried out with the calculation of their supply in soil in receipt of microelements composition in getting forage. That's why we investigated microelements and carotene in the plant forage of the local origin [11]. All the sorts of fodders were used for the researches: green grass, coarse, juicy, concentrating.

Forage samples are chosen on constructions of the takings and keepings of the food examples for chemical analysis, elaborated All-Union Scientific-Research forage named after V.R. Vilyams. For the forage characteristics in microelements composition and carotene was chosen 1 kg of the sample, dried at 105^0C. A middle sample of the plants for the laboratorial analysis was directly formed in the field by means of the choice aboveground part of the plants in the vegetation different phases [12].

For revealing of the effect of mineral fertilizers and agrotechnical method (harrowing) on productivity and food quality of phytocenoz (wormwood ephemer)the following investigations were conducted:

The experiments on study of the effect of macro-microfertilizers, and harrowing in 2 (two) traces on productivity and forage qualities of wormwood-ephemer phytocenoz.

The experiment was carried out in 2 layings on the following scheme in 2009-2012.

1. Control – unimproved pastures (wormwood-ephemer with the admixture of saltbushes);

2. Background – $N_{90}P_{60}K_{60}$- macrofertilizer;

3. MF-(mineral fertilizer) $N_{90}P_{60}K_{60}$+ +Mn SO_4 (4kg/h) +Cu SO_4(3)+ $ZnSO_4$(3)+ +$CoSO_4$(3) + Na_2SeO_3 (3);

4. Background + harrowing in 2 traces;

5. MF+ harrowing in 2 traces.

Geobotanical description of the experimental area was carried out before laying. Mineral fertilizer was applied as ammoniac saltpeter, double superphosphate and potassium chloride, $N_{90}P_{60}K_{60}$ active substance, microfertilizer as manganese sulphate – 4 kg/h, copper- 3 kg/h, zinc- 3 kg/h, cobalt – 3 kg/h and selenite natrium- 3 kg/h in salt physical weight. Harrowing of soils was conducted with the harrows. BDT-3.

Mineral fertilizers are applied at the bedinning of March every year. Before application the microfertilizers were mixed with the soil portion (for their evener distributions in the ploughing layer). An area plot is 50 m^2, randomized disposition, replication- 4-th multiple. 1. Calculation of crops was performed by a solid method, definition of dry substance composition – a method of trial sheaf with the following aridity in thermostat at temperature - 105^0C. The chemical analysis of the plants was performed on the following methods composition of total nitrogen by Keldal, crude fat, cellular tissue, crude ash, phosphorus, potassium, calcium according to CPI -14 M·zinc- dithizone; cobalt- nitroze-R-salt; manganese- persulphate, selenium - calometric; copper- diethyl carbonatic

lead: carotene- by Tserel, by calorimetrik method. 3. Agrochemical analysis of soils-according to a method which indicated in the «Aqrochemical methods of soil analysis» [13, 14]. 4. Composition of exchangeable energy in dry substance, an economical efficiency of the investigative methods in connection with the method which indicated in "Systematic recommendations on definition of the energetic nutritiousness in fodder" [15]. 5. Mathematic elaboration of the investigation results – on V.A. Dospekhov's method [16].

RESULTS AND DISCUSSION

For achievements of the reseach purposes the works were performed in two stages: 1) ecological value of soil-landscape complexes, reveal of the provision degree of the cattle ration with the nutrient. 2) removal of the negative factors by means of fertilizer application and improvement of the water-air regime in the pasture lands by harrowing.

Evaluation of the landscape complexes in the Gobustan massif was performed on generally accepted method. The Soil map of the Gobustan massif (S 1: 50000), geobotanic, landscape maps and bonitet scale of the pasture lands were used for it. The drysteppe and semidesert landscapes which were evaluated by the next method (Table 2) were revealed on the territory of Gobustan.

Table 2 – Scores of bonitet in the complex semidesert accumulative plain of the Gobustan massif with the calculation of the evaluated scales on microelements in the forage plants

№	Landscape complexes	An area		Weighing score of bonitet	Coefficient of the com parative qu ality in the land scape	Productivity of the arid substance, c/h
		hectare	%			
1	Wormwood salsola nodu losa in grey – brown soils	25041.0	31.2	49	1.20	6.97
2	Wormwood – ephemer (with the admixture of salt-bush) in grey –brown soils	28675.0	35.7	47	1.15	6.81
3	Wormwood- salt-bushes in grey-brown soils	6049.0	7.5	35	0.85	5.91
4	Wormwood- seep weed in weakgrey – cinn ammonic and grey-brown soils	2132.0	2.7	46	1.12	6.31
5	Sea beite ephemers formation on the weak grey and grey-brown soils	12085.0	15.0	32	0.78	5.54
6	Conditionally unfit lands	6342.5	7.9	10	0.24	-
Totally on semidesert		80324.5	100	41	1.00	6.05

As is obvious the landscapes of the semidesert zone in Gobustan possess very low evaluated mark (41 scores), though occupy about 70 % of the territory of the winter pastures. Wormwood – ephemer (with the admixture of saltbush) landscape complex with which all our further investigations will be related, occupies more one third of all semidesert zone and gets 47 scores. Productivity of this phytocenoz is also-6.81 c/h, it is distributed over the seasons: sping- 4.89, but autumn-1.92 c/h.

On the basis of the conducted analyses the biochemical parameters of the basic phytocenozes were revealed in grey-brown soils of the semidesert zone. The qualitative parameters of wormwood-ephemer phytocenoz: in an absolute dry substance in %-protein-8.62; fat- 3.64; cellular tissue- 38.3; ash-13.38; BEV-36.09; in 1 kg of forage – 0.36 kg of fodder units; digestive protein 0.43g/kg calcium - 2.44; magnesium- 0.30; potassium -1.34; natrium - 0.02. Copper - 9.0 mg/kg; iron - 240.0; zinc - 28.8; manganese - 112.0; cobalt - 0.50 (mg/kg).

According to information of CSI Absheron naturally–economical zone, the type ration of the milking cows with the daily productivity is 10-12 kg of milk and vivid weight is 400-500kg: hay from natural greenlands-4 kg, succulentgrass-5 kg, barley strow - 3 kg, maize silage-5 kg, fodder beet-5 kg,- mixfodder 0.3 kg.

Table 3 – Provision of the animals ration with the nutrient

Nutrient of the ration	All is aintained in ration		In 1 kg of dry substance		Optimum norms of maintenance		Provision in % to norm	
	1	2	1	2	1	2	1	2
Dry substance (kg)	12.6	1.53	--	--	--	--	--	--
Fodder unit	8.8	1.03	--	--	--	--	--	--
Degistive protein (g)	1094	1.55	86.8	101	106	122	81.9	82.8
Calcium(g)	72	10.3	5.7	6.7	6.0	8.0	95.0	83.8
Prosphorus (g)	38	5.9	3.0	3.9	4.2	4.0	71.4	97.5
Carotene(g)	254	29	20.2	20	40.2	22.0	50.2	90.9
Copper (g)	69.5	9.3	5.5	6.1	9.0	8.0	61.3	76.2
Zinc (mg)	389.0	38.1	30.9	24.9	40.0	30.0	77.2	83.0
Manganes(mg)	531.2	30.0	42.2	19.6	50.0	55.0	84.4	39.2
Cobalt (mg)	6.03	0.80	0.48	0.52	0.70	0.70	68.5	74.2
Selenium (mg)	0.89	0.09	0.07	0.60	0.10	0.10	70.0	60.0

From table 3 is obvious that according to such nutrient as degistive protein, phosphorus, carotene and all the enumerated microelements of the horned cattle's ration significantly yield optimum, or on average 26.7 %, but a sheep -23.0 %, that is absolutely inaccessible for provision of the high productivity from animals.

1-milking cows; 2-sheep-viviparous

It is known that the best method for surface improvement of the natural green lands is an application of mineral (macro- and micro) fertilizers and harrowing which ensure optimization of the food and water-air regime in soils. The conclusions of our researches showed that an application of mineral fertilizers and harrowing in the semidesert pastures promote increase of the crops in pasture forage and their quality improvement.

As is obvious from Table 4 macro and microfertilizer positively influense on productivity of wormwood –ephemer phytocenoz. Increase of the fodder units forms

56.48-74.54 %. However, this efficiency intensifies under improvement of water – air regime in soils by means of harrowing -81.48 %.

It is known that the following formula (2) is used for pasture loading definition:

$$Q = \frac{M}{k \cdot t} \qquad (2)$$

Where:

Q- pasture loading (on total number); M- fodder unit from 1 hectare; k-daily need of the fodder units per one sheep; t- grazing time.

By calculation it was revealed that 1.40kg of fodder units is required 40-50 kg for each sheep, but grazing time in the semidesert pastures is 160 days, that is from November 15 to April 25. Thus in the unimproved pastures per one hectare loading forms 1.0 head on average, but under application of fertilizers and harrowing a capacity of the pastures rises 2 times, i.e. 2 sheep can already be grazed per each hectare.

Table 4 – Influence of agrochemical methods on productivity of winter pasture in Gobustan

Versions	Crops of the pasture forage on average dry mass for 3 years, s/h			Increase and control		Exit of the fodder units, s/h	Increase of fodder units for control	
	Spring estrangement	Autumn estrangement	Total	s/h	%		s/h	%
Control	1.57	1.42	5.99	-	-	2.16	-	-
Background $N_{90}P_{60}K_{60}$	2.92	6.47	9.39	3.40	56.76	3.38	1.22	56.48
MF – Background+ +Mn(4)+Cu(3)+ +Zn(3)+Co(3)+Se(3)	4.25	7.21	11.46	5.47	91.31	4.13	1.97	91.20
Background + harrowing	3.76	6.97	10.73	4.74	79.13	3.86	1.70	78.70
MF+ harrowing	3.54	8.34	11.88	5.89	98.33	4.28	2.12	98.15

At present a system of the fodder nutritiousness mark is mainly performed on composition of the exchangeable energy, so it is the most reliable, stable and objective criteria characterized potentially accessible for use of the fodder energy part by animals.The exchangeable energy (accesessible for energy exchange, physiological energy) presents that part of the gross energy which remains in animal's organism after its loss with feces, urine and wind being formed in the digestive tract. The exchangeable energy is expressed by the following formula (3):

$$EE = GE - FE - UE - WE \qquad (3)$$

Where EE - exchangeable energy; GE - gross energy, FE - feces-energy, lost by feces; UE - urine-energy, lost by uring; WE - wing- energy, lost by wing. A calculation of the exchangeable energy in dry substances of the forage is defined in connection with the systematical recommendations [16] on definition of the energetic

nutritious ness of fodder for a ruminant formula (4): in our researches:

$$EE_{sheep} = 0{,}177\ DP + 0{,}379\ DF + \\ + 0{,}134\ DCT + 0{,}14\ DNE \qquad (4)$$

Where, EE_{sheep} – degistive, DP - degistive protein; DF - degistive fat; DCT - degistive cellular tissue; DNE - degistive nonnitrogen extractive substance in percentages.

The researches showed that an application in their background both mineral fertilizer and harrowing influenced the biochemical composition, nutrious value of forage. Strong difference of the exchangeable energy isn't visible in fodder dry substance under versions in which both control and macro-mikrofertilizers, are applied.

Table 5 – Energetic nourishement and economical efficiency of agrotechnical methods (doses) in wormwood-ephemer pasture

Versions	Average-weighing parameters for 3 years, in absolute dry substance,%				
	Control-unin-proved pasture	Background $N_{90}\ P_{60}K_{60}$	Background + +$MnSO_4$ (4kg/ha)+$CuSO_4$(3 kg/ha)+$ZnSO_4$(3 kg/ha) +$CoSO_4$(3 kg/ha) +Na_2SeO_3(3 kg/Ha) – MF-mineral fertilizers	Back-ground + harrowing in 2 traces	MF+ har-rowing in 2 traces
Ash	11.38	11.61	12.29	11.12	12.19
Protein	9.62	10.92	12.03	11.62	12.66
Fat	3.64	3.77	4.00	4.70	4.03
Cellular tissue	39.30	37.89	35.41	35.89	34.13
NES	36.06	35.81	36.27	36.67	36.99
Exchangeable energy, Mgj/ kg dry sub-stance	7.56	7.72	7.82	7.92	7.91
Collection of the exchange-able energy, thousand Mgj.	45.2	72.49	89.69	84.98	93.97
Addition, thousand Mdj	-	27.29	44.40	39.78	48.77
Cost of addi-tion manats / hectare	-	409.35	666.00	596.70	731.55
Sum of the additional loss, manats / hectare	-	262	282	312	332
Conditionally net profit, mantas/ hectare	-	147.4	384.0	287.7	399.6

However the tendency for exchangeable energy increase in all the investigative versions which showed that the conducted calculations of the nutrient collection from crop gave enough visible advantage of the versions with the application of microfertilizers as compared with the control. The most collection of the exchangeable energy provided mineral fertilizer combination (macro and mikrofertilizers) and harrowing. As compared with the control the addition formed 48,77 thousand Mgj or 108 %.

By calculations of the economical efficiency of application of the different fertilizers and agrotechnical methods (doses) the loss related to their application is taken into account. The researches showed that an application of microelements on background of macrofertilizers with harrowing in 2 traces was economically profitable. In spite of high level of loss, this agrotechnical method (dose) ensured receipt of 399, 6 manats /hectare of the net profit conditionally.

CONCLUSION

1. Semidesert soil-landscape complexes occupy 80324.5 hectare or 67 % from the total territory in the Gobustan winter pastures. The most spreading wormwood –ephemer (with the admixture of saltbushes) phytocenozes in the grey-brown soils. Their productivity is low-6.81 c/hectare, so the grey –brown soils under conditions of arid subtropic climate are weakly provided with the nutrient: on the horizon of 0-20 cm the humus content vibrates in limits of 1.56-1.68 %; total nitrogen—0.094-0.104 %; total phosphorus-0.10-0.15 %; total-potassium - 204-298 mg/kg; pH- 8.5-9.0; content of the active forms of microelements: manganese-4.80-5.10 mg/kg; copper-0.16-0.22; zinc-0.18-0.24 ; cobalte- 0.14-0.18; selenium-0.064-0.068(mg/kg of arid soil. On the basis of the main diagnostical signs of fertility and special ecological scales the ecological mark of the soil-landscape complexes which showed that the semidesert landscape possess low- 41 scores of bonitet, that don't obviously provide a need of the stock breeding's increase was performed.

2. A calculation of the ensurement of the cattle with the nutrient showed that the sheep are only provided with 82.8 % of degistive protein; copper-76.2; manganese-39.2; cobalte-74.2; selenium-60.0 % and so on. That is completely inadmissible for ensurement of the high productivity of the animals.

3. The calculations showed that at given productivity of the pasture and durability of the semidesert pastures utilization for 160 days on average since 15.IX-till 25.IV) the loading shouldn't increase 0.7-1.3 of the heads per hectare. However, unsystematic and intensive use of the winter pastures under conditions of arid climate of the dry subtropics extremely leads to loss of the fertile lands and intersification of the desertification process.The result of ecological monitoring testify about it: for last 40 years an area under steppe landscapes rose from 22.7 % to 12 %, but an area of semidesert till 67 %, an area of the soils in a high quality shortened 3 times and reduced their scores of bonitet from 92 to 86. Productivity of steppe phytocenozes reduced from 14.8 c/h to 12.48 c/h, but semidesert –from 9.74 c/h to 6.05 c/hec. In connection with what and were performed the experiments on surface improvement in the winter pastures.

4. The conclusions of our investigations showed that an application of macro and microfertilizers in combination with harrowing of 2 traces ensures optimization of the food and water-air regime of soils and promote over increase of the productivity in wormwood- ephemer(with the admixture of salt bush) of phytocenoz from 5.99 to 11.88 c/h or 98.33 %, addition of the fodder units formed 98.15 %.

An addition of the collection in exchangeable energy rose 2 times.

5. The researches showed that an appilication of microelements $MnSO_4$(4 kg/h) + $CuSO_4$(3 kg/h) + $ZnSO_4$ (3 kg/h) + + $CoSO_4$ (3 kg/h)+Na_2SeO_3 (3 kg/h) on the background of $N_{90}P_{60}K_{60}$ in combination with harrowing of 2 traces was economically profitable. In spite of the high level of loss (332 manats per hectare) this agrotechnical method ensure a receipt of conditional – net profit for 399.6 manats from hectare.

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ЖАРТЫЛАЙ ШӨЛДІ ЖАЙЫЛЫМ ТОПЫРАҚТАРЫНА ЭКОЛОГИЯЛЫҚ БАҒА БЕРУ ЖӘНЕ ЖАҚСАРТУ

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Таулары төмен үстірт және қыраттарға ауысатын Үлкен Кавказдың оңтүстік–шығыс баурайында орналасқан Әзірбайжанның Гобустандық қысқы жайылымдары,мұндағы тарихи–дәстүрлі отарлы мал шаруашылық ауданы болып табылады. Аумақтың 67 %-дан астамы 41 балл бонитетінен аспайды, ал орташа өнімділігі - 6,05 ц/га құрғақ масса. Бұл құрғақ климатқа және мұнда үстемдік ететін аз өнімді сұр-құба топырақпен әлсіз қамтамасыз етілуіне байланысты. Жайылымдық жерлерді жақсарту мақсатында жусанды-эфемерлі жайылымдардың өнімділігіне 2 ізбен тырмалау әдісін қолдану мен минералдық (макро және микро) тыңайтқыштардың әсерін ұштастыра отырып зерттелді. Нәтижелері тәжірибе көрсеткендей осы агро әдістерді пайдалану рұқсат етілетін жайылымдық жүктемені 2 есеге, айырбастау энергиясын жинау 108 % - ға артты, ал соның ішінде таза пайда 399,6 ман/га құрады.

Түйінді сөздер: агроэкология, бағалау, жартылай шөлдер, микроэлементтер, азықтық алқаптар, жайылымдар.

РЕЗЮМЕ

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ЭКОЛОГИЧЕСКАЯ ОЦЕНКА ПОЧВ ПОЛУПУСТЫННЫХ ПАСТБИЩ И ИХ УЛУЧШЕНИЕ

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Гобустанские зимние пастбища Азербайджана, расположенные на юго-восточных склонах Большого Кавказа, где горы переходят в невысокие плато и возвышенности, являются районом исторически-традиционного отгонного скотоводства. Более 67 % территории не превышает 41 балла бонитета, а средняя продуктивность - 6,05 ц/га сухой массы. Это связано с аридным климатом и со слабой обеспеченностью господствующих здесь малопродуктивных серо-бурых почв. Для улучшения пастбищных земель было изучено влияние минеральных (макро- и микро) удобрений в сочетании с боронованием в 2 следа на продуктивность полынно-эфемеровых пастбищ. Результаты опытов показали, что использование этих агроприемов увеличило допустимую пастбишную нагрузку в 2 раза, сбор обменной энергии на 108 %, а чистая прибыль при этом составила 399,6 ман/га.

Ключевые слова: агроэкология, оценка, полупустыня, микроэлементы, кормовые угодья, пастбища.